DISSERTATION ON

MANAGEMENT OF PERIAMPULLARY CARCINOMA IN TMCH

M.S.DEGREE EXAMINATION

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CERTIFICATE

This is to certify that this dissertation entitled

"**MANAGEMENT OF PERIAMPULLARY CARCINOMA IN TMCH"**

is a bonafide record of work done by **Dr. P. SENTHIL KUMAR,**

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CONTENTS

INTRODUCTION

Periampullary carcinoma is a distinct clinicopathological entity arising within 2 cm of the major papilla in the duodenum. They encompass four different types of cancers:

1. ampullary(ampulla of vater)
2. Biliary (intrapancreatic distal bile duct)
3. Pancreatic (head –Uncinate process)
4. Duodenal(mainly from the second portion)

70% to 80% of theses tumors are well differentiated adenocarcinomas. Although, these tumors have different orgin, the complex regional anatomy and their proximation within that confined region generally dictate a common operative approach.

Radical resections, such as the whipple's procedure or its variant with preservation of the pylorus with or without extended regional lymphadenectomy, have been the main treatments for these cancers, especially with the currently low morbidity and mortality rates. Although the perioperative outcomes for these different cancers are similar, the long term survival has traditionally varied. Consequently, as the exact tumor origin is often difficult to clinically ascertain, surgeons have favored an aggressive approach toward resection to benefit those patients harboring cancers with a better prognosis.

It is unknown why outcome should vary for adenocarcinomas arising from different anatomic sites in such close proximity. Indeed, if survival does vary significantly for those cancers as clinical impression suggests, clearly, factors other than anatomy must also be involved.

Since, Periampullary carcinoma is one of the commonest cause of obstructive jaundice & highest cure rate following resection is possible, this study is undertaken to know the differences in the clinical behavior of the Periampullary carcinoma and to define which of these factors, affect the disease outcome and alter the survival.

AIM OF THE STUDY

1. To evaluate the incidence of Periampullary carcinoma in TMCH from June 2004 to October 2006.
2. To know the aetiological and epidemiological factors associated with these cancers.
3. To know the clinical manifestation and investigations to aid the diagnosis and assess the resectability of these tumors.
4. To study the treatment instituted and the management of complications
5. To review the literature on the subject.

REVIEW OF LITERATURE

EMBRYOLOGY

The caudal foregut and the cranial midgut generate the duodenum. The origin of the bile duct, the pancreas, and the ampulla of vater arise from the foregut just above its junction with the midgut.

Embryologically and anatomically, patterns of periampullary cancer spread should be similar for pancreatic, ampullary and distal bile duct cancers because they are foregut derivatives. In contrast, infra-ampullary duodenal cancers should spread along the superior mesenteric or midgut pathways.

Because of the ambiguous lymphatic drainage of the head of pancreas, lymphatic metastases from pancreatic cancers are less predictable and are likely to extend along the foregut and midgut pathways.

Invasion of the pancreas by nonpancreatic periampullary cancers likely predisposes to similar patterns of spread. Because most periampullary cancers arise commonly from the distal foregut, anatomic or embryologic factors likely contribute little to differences in outcome.

SURGICAL ANATOMY

Pancreas

Glandular and Retroperitoneal organ, transversely placed at L1 level (12 – 20cm long, 60 – 125g wt), and has close proximity to many organs and great vessels leads to early local invasion

- ❖ Related to omental bursa above and greater sac below, Anterior–transverse mesocolon, Posterior–avscular fusion planes of Toldt and Treitz.
- ❖ Arbitrarily divided into head, neck, body & tail
  - Head – Rt. of SMV (45—50% of gland)
  - Neck – on Superior Mesenteric Vessels
  - Body & tail – lateral to Lt. Bolder of SMV
  - Uncinate process.

Head of Pancreas

- Widest and thickest part of the gland
- intimately fit into the C loop of duodenum
- Anterior – pylorus,transverse colon ,mesocolon and anterior arcade of vessels
- Posterior - avasclar fasciae of Treitz separates from the retroperiponeal structures

Arterial supply

Gatroduodenal and SMA form anterior & posterior. arcades over the Head.

Anterior & Posterior Pancreaticoduodenal arteries supplies head of pancreas and duodenum. This intimate blood supply is one reason for combined pancreaticoduodenal resection.

- Anterior Arcade lies embedded in the pancreatic substance and close to duodenum.
- Posterior Arcade lies away from duodenum and outside the pancreas.
- Inferior PD arteries may arise from 1st jejunal branch, ligation of this may endanger DJ flexure.

Anomalies which cause concern in pancreatic surgery are aberrant common hepatic from SMA, Acessory Rt.HA from SMA, Acessory Lt. HA from gastroduodenal or from Rt. Side of SMA.

Venous Drainage

Both arteries & veins lie posterior to duct and veins draining the pancreatic parenchyma eventually terminate into portal vein and its major tributaries. Small veins enter major veins laterally, this facilitates assessment by finger between neck and portal vein so also the dissection

Lymphatic drainage

Rich perilobular network draining into all direction posing challenge to oncological resection. Lymphatics drain to the nodes in the pancreatico duodenal

groove. These nodes are anterior and posterior pancreatico duodenal,superior and inferior head nodes, from these nodes, lymph drains to the portal, coeliac, mesenteric and para-aortic nodes.

Innervation

Sympathetic post ganglionic fibers from the coelic ganglion serve as the principal pathways for pain of pancreatic origin. Parasympathetic fibers from vagus serve as an exclusive efferent function.

Structure and Histology

Of the pancreatic mass, 80-90% is composed of exocrine tissue, remaining is endocrine tissue. The pancreatic duct is lined by columnar epithelium from which most of the cancers arise.

The mucosa of the ampulla of Vater is lined by columnar epithelium and is thrown into longitudinal folds likened to mucosal valvules.

Ampulla of Vater

Papilla is present in the posteromedial wall of the second part of duodenum 8to 10 cms distal to pylorus. In the papilla, there is the ampulla of Vater into which both pancreatic and common bile duct open. The ampulla of Vater is

guarded by sphinter known as the **Sphinter of Oddi**, which regulates flow into the duodenum & gallbladder filling, and resists reflux of duodenal contents. Proximal to the sphinter of oddi, distal common bileduct is guarded by sphincter choledochus known as **Sphinter of Boyden** and pancreatic duct is guarded by **sphinter Pancreaticus**. The oblique passage of the ducts through the duodenal wall and the presence of mucosal valvules may also help to prevent reflux.

Common bile duct

It is divided into supra duodenal, retroduodenal, infraduodenal and intraduodenal part. The infra duodenal part, that is the retropancreatic portion, runs in groove or tunnel in the pancreas, approaches the second part of duodenum obliquely accompanied by the terminal part of pancreatic duct.

- Blood Supply of lower CBD - superior pancreaticoduodenal Artery
- Venous drainage – portal vein
- Lymphatic drainage – Lower hepatic node, upper pancreatico splenic node
- Nerve Supply – plexus over the superior pancreaticoduodenal Artery.

Second part of the duodenum

- 7.5 cms in lengths, hugs the head of pancreas.
- Supplied by superior and inferior pancreatico duodenal arteries.
- Venous drainage – spleenic, Sup. Mesenteric and portal vein

SURGICAL PHYSIOLOGY

In response to a meal, the pancreas secretes digestive enzymes in an alkaline (pH 8.4) bicarbonate-rich fluid. Spontaneous secretion is minimal the hormone secretion, which is released from the duodenal mucosa, evokes a

bicarbonate-rich fluid. Cholecystokinin (CCK) is released from the duodenal mucosa in response to food: CCK produces no increase in the volume of secretion but is responsible for enzyme secretion. Vagal stimulation increases volume. Protein is synthesized at a greater rate (per gram of tissue) in the pancreas than in any other tissue, with the possible exception of the lactating mammary gland. About 90 % of this protein is exported from the acinar cells as a variety of digestive enzymes. Approximately 6 – 20 g of digestive enzymes enters the duodenum each day. Nascent proteins are synthesized as preproteins, and during their transit through the rough endoplasmic reticulum Golgi cistranae the newly synthesized proteins undergo modification in a sequence of steps. The proteins move from the rough ER to Golgi complex, lysomes and mature zymogen storage granules containing proteases are stored, and move to the ductal surface of the cell, from which they are extruded by exostosis. During this phase, the proteolytic enzymes are in an inactive form, the maintenance of which is important in preventing pancreatitis.

Bile, as it leaves the liver, is composed of 97 % water, 1 – 2 % bile salts and 1 % pigments, cholesterol and fatty acids. The liver excretes bile at a rate estimated to be approximately 40 ml/hr. The rate of bile secretion is controlled by cholecystokinin, which is released from the duodenal mucosa. With feeding there is increased production of bile.

PATHOLOGY

Accurate histological classification of periampullary cancers can be notoriously difficult. Two practical points are useful in defining the orgin of these cancers, the predominent site of mass, the presence of any component of carcinoma in situ.

Periampullary cancers are derived from their respective epithelia and almost all are adenocarcinomas. Duodenal cancers can be classified morphologically as polypoid, flat elevated and ulcerative-invasive; Ampullary and biliary cancers are classified as papillary, nodular and sclerosing types. Regardless of orgin, polypoid and papillary cancers have been associated with better prognosis.

The degree of cancer cell differentiation varies widely among the periampullary cancers. Undifferentiation (higher histopathlogical grade), is greatest for pancreatic cancers and least for ampullary cancers.

Zhu et al address similarities between duodenal and ampullary cancers. CEA in 73% of duodenal and 63% of ampullary cancers, p53 in 20% duodenal and 13% ampullary cancers, c-neu in 60% duodenal and 100% ampullary cancers.

Longnecker et al compared histologic findings between distal bileduct and pancreatic cancers. Desmoplasia was common in both cancers. And both had propensity for perineural invasion. Moreover, molecular and pathological features of oncogene and tumorsuppresor genes were similar and did not help to differentiate between the two cancers.

Ebert et al evaluated the presence of mutation on k-ras oncogene at codon 12, which has been traditionally expressed in more than 80% of pancreatic cancers. Ampullary cancers had mutations at codon 13.

Friess et al suggest a different molecular pathway in the development of ampullary and pancreatic cancers. The lack of upregulation of EGFR(epidermal growth factors) in ampullary cancers could partly account for their less aggressive behaviour (a different phenotype).

Markers of tumor biology in periampullary cancers suggest that genetic differences between these cancers probably contribute significantly toward phenotypic differences and the perceived clinical differences among periampullary cancers.

Pathological examination of resected specimens showed that adenocarcinoa of head of pancreas was 40 to 60 % ampulla of Vater 20 to 40%, distal CBD 10%, and duodenum 10% But, overall, the carcinoma of head of pancreas is the likely site of orgin upto 90% of cases.

The majority of carcinoma of ampulla Vater, appear to be the intestinal type and show histological resemblance to colorectal adenocarcinoma.

Cattell and Pyrtek first reported malignant transformation of an adenoma of papilla. In more than 70% of investigated carcinomas of ampulla, tissue

samples were found with severe dysplasia. At present there are substantial arguments, including molecular biological data, for hypothesis of an adenoma-dysplasia- carcinoma sequence of neoplastic lesion of ampulla. A villous adenoma of ampulla of Vater is considered as a premalignant lesion, with the consequence of complete extirpation of the lesion to avoid development of cancer. The frequency of a malignant lesion in an adenoma of the papilla is around 26%.

EPIDEMIOLOGIC CONSIDERATIONS

INCIDENCE

Overall Periampullary cancers account for 5% all GIT malignancies. Pancreatic cancer occurs most often among periampullary cancers. They account for 3% of all GIT cancers. Ampulla of Vater represents less than 1% and adenocarcinoma of duodenum represents about 0.5% of all GIT cancers. Carcinoma of ampulla of vater occur more frequently than distal CBD cancer with a ratio of 1:12

AGE

The incidence of periampullary carcinoma increases steadily with increasing age, and over 80 % of the patients seen in 6-8 decade of life.

SEX

The male to female ratio is usually reported as between 1.5 : 1 to 2 :1.

PREVALENCE

Surgeons should recognize the reports on operative result do not represents their actual incidents. Among resected Periampullary cancers, Ca .of head of Pancreas accounts for 50% to 70% Ampullary cancers for 15% to 25% Biliary cancers for 10% and duodenal cancers for 10%. These data reflect the prevalence of resected cancers.

Overall, perioperative mortality and morbidity for each cancers are similar, 0% to 15% and 30% to 50% respectively

SURVIVAL

Survival is greatest for ampullary and duodenal cancers and is intermediate for biliary cancers & least for pancreatic cancers.

Although the perioperative outcome for these different cancers are similar, the long term survival has traditionally varied. It is unknown why outcome should vary for adenocarcinoma arising from different anatomic sites in such close proximity.

AETIOLOGY AND RISK FACTORS

I. ENVIRONMENTAL

1. **Cigarette Smoking**

This is only environmental factor that has been consistently associated with the pancreatic cancer. There is 2-3 fold increase in risk. The mechanism appears to be related to tobacco specific nitrosamines.

Alternatively, smoking can elevate blood lipids which may also increase the risk of pancreatic cancers. There is a dose relationship to the number of cigarettes smoked and the occurrence of pancreatic cancer. Upto 25 % of pancreatic carcinoma is believed to be attributable to cigarette smoking.

2. Diet

A high intake of fat, meat or both increase the risk by 1.5 times. Whereas the intake of fresh fruits and vegetables appears to have a protective effect. The diets high in fat stimulate cholecystokinin release which may induce pancreatic ductal hyperplasia and hypertrophy of acinar cells increased diatary protein associated with meat intake affect pancreatic enzyme out put.

3. Ethanol

The evidence at the present time does not support the view that it is a risk factor.

4. Coffee

A case control study in Japan and a metanalysis of data published between 1981 and 1983 did not support the notion that either caffeinated or decaffeinated coffee or teas were risk factors for pancreatic cancer.

5. Toxic Substances

Pancreatic cancer as well as bile duct cancer has been associated with occupational exposures to 2 – Naphthylamine and benzidine.

II. MEDICAL CONDITIONS

1. Pancreatitis

Tropical and hereditary pancreatitis are associated with increased incidence of pancreatic cancer. A multicenter International study found that 1.8 % of patients with chronic pancreatitis developed pancreatic cancer during a mean follow up of 7.4 years. Occasionally a patient may present with acute pancreatitis as the first manifestation of carcinoma.

2. Partial Gastrectomy

There is 5-7 times increased incidence of pancreatic cancer after 15-20 years of partial gastrectomy. It may be related to increased production of nitrosamines.

3. Cholecystectomy

Increased endogenus production of cholecystokinin can be seen in patients following this surgery, which has also been associated with increased risk of pancreatic carcinoma.

4. Diabetes Mellitus

There is no consistent epidemiological association with diabetes mellitus and periampullary carcinoma. But this association appears to be the result of destruction of pancreatic tissues owing to the obstructing periampullary cancer and the resultant endocrine deficiency. Therefore, as with chronic pancreatitis the development of diabetes in patients after 40 years of age should be considered a clue to the diagnosis of pancreatic cancer.

5. Adenoma

There is a hypothesis of adenoma-dysplasia carcinoma sequence of neoplastic lesions of ampulla. A villous adenoma of ampulla of Vater is considered as premalignant lesion, with the frequency of 26 % malignant transformation.

III. MOLECULAR GENETIC FACTORS

There is a association of **familial polyposis** of the colon and **Gardner's syndrome** with the periampullary carcinoma. In both conditions, adenomatous polyps of the duodenum or ampulla predispose to the development of carcinoma. The risk is 200 times that of the normal population.

There is association of hereditary pancreatitis, **Von Hippel – Lindau's Syndrome, Lynch's Syndrome II and ataxia telangiectasis** with pancreatic cancer.

Molecular abnormalities includes a mutant C-Kirsten-eas (c-ki-ras) gene on codon 12 (upto 85%), and c-fos. Loss or a mutation of the p53 tumorsuppressor Gene at the locus 17p 13 (50-70%) and over expression of EGF receptor are also associated with pancreatic cancer.

CLINICAL PRESENTATION

The early symptoms are usually vague and include anorexia, weight loss, abdominal discomfort and nausea. Specific symptoms develop only after invasion or obstruction of near by structure.

Jaundice:

This is the specific symptom with which the patient presents. It is progressive in nature, and associated with pruritus which is due to irritation of cutaneous sensory nerves by retained bile salts. Pruritus relieved by bile salt chelating resin-cholestyramine suggests that bile salts are responsible for pruritus.

Painless jaundice, infact, is found only in minority of patients. Most of the patients present with painful jaundice.

Patient will pass yellowish urine due to increased excretion of bilirubin and clay coloured stools due to the absence of stercobilin.

Pain:

50-80% of presenting symptom of periampullary cancer. abdominal pain is present less commonly in ampullary cancer than carcinoma Head. In majority of patients, pain of moderate intensity is present as a result of obstruction of either the biliary or the pancreatic duct. The more intense pain may be due to invasion of retropancreatic nerves as well as due to obstruction of the pancreatic duct.

Weight loss

In periampullary growth weight loss will be progressive. By the time the diagnosis is made, weight loss of more than 10 % of ideal body weight is common. There are several possible explanations for the weight loss. Decreased intake of food is the commonest cause due to pain associated with anorexia. The other causes are malabsorption and increased catabolic activity.

Malena

There may be malena due to bleeding from the tumor or due to infiltration of the duodenum, stomach, or colon. In some patients bleeding may be occult. Clay coloured stools are common and when mixed with blood it is called silvery or aluminium paint stool.

Vomiting

Nausea and vomiting due to duodenal obstruction, are usually late manifestations.

Diabetes

New onset diabetes is observed in 15 % to 20 % of patients with pancreatic cancer two years before diagnosis.

Others

Obstructions of pancreatic duct may result in malabsorption and steatorrhea. An unexplained attack of pancreatitis in an older patient may be due to periampullary growth. The other less common manifestation is superficial thrombophlebitis.

PHYSICAL FINDINGS

Gall bladder

Although the gall bladder is frequently found distended at Laparotomy, it is palpated on clinical examination in about 30 %-50 % of patients with periampullary carcinoma.

Courvoisier's Law

In obstruction of the common bile duct due to stone, distension of gallbladder seldom occurs; the organ usually is already shriveled. In obstruction from other causes, distention is common by comparison.

The reason for this difference between the two common causes of obstructive Jaundice is two fold. First in patients with calculous obstruction, the gallbladder is commonly affected by cholecystitis with fibrosis and so it cannot readily distend. In patients with periampullary carcinoma, the gallbladder is usually normal and therefore it is distensible.

Secondly in patients with stone in the duct the obstruction is usually incomplete so that the pressure in the ductal system does not rise as high as in malignant obstruction, where the obstruction is usually complete and continuous.

Hepatomegaly

It is palpable in about 50 % of cases. It does not denote inoperability, since it may be due to biliary obstruction and not due to hepatic metastases. If there is a nodular liver with ascites, it indicates inoperability. Ascites is present in 25 % of cases.

Splenomegaly

This is due to splenic vein thrombosis and occurs in about 10 % of cases.

Inoperable signs

Patient with peritoneal spread may present with palpable mass, ascites, umblical nodule, blumer shelf and Virchow's Node (consequence of tumor cell arriving via thoracic duct)

Few patients may present with pleural effusion, bone metastases. They indicate inoperability

INVESTIGATIONS

Laboratory investigations

I. Urine examinations – To detect jaundice.

1. Macroscopic – colour – It will be yellow or dark yellow in colour.
2. Biochemical

Bile salts, bile pigments – will be positive.

Urobilinogen – will be negative.

II. Motion examination

1. Macroscopic – colour- clay coloured due to absence of stercobilin. Sticky, tarry malena stools due to bleeding.
2. Occult blood – positive, if there is bleeding from periampullary growth.

III. Blood investigations.

1. Haemoglobin – may be low.
2. Blood sugar – High if the patient is diabetic.
3. Blood urea and creatinine may be elevated due to renal impairment in obstructive jaundice.
4. Serum bilirubin – to confirm the hyperbilirubinemia. Normal – upto 1 mg. At 2 mg, the tinge of jaundice appears, there will be conjugated hyperbilirubinemia.
5. Serum Alkaline phosphate (ALP) Normal Level – 35 to 130 IU / L. It will be elevated in the obstructive jaundice.
6. Serum Transaminases (ALT, AST). Normal Level – 5 to 40 IU/L. Mild to moderate elevation is seen in the obstructive jaundice.
7. Prothrombin Time Normal – 12 to 16 seconds.It may be prolonged in the obstructive jaundice and correctable with administration of injection vitamin K.

8. Serum proteins. Normal – 6.5 to 8 gm %. They may be decreased and reversal of albumin – globulin ratio may be seen.

DUODENOSCOPY

This is the most useful investigation to diagnose the carcinoma of the ampulla of vater, with side viewing instrument,

1. Growth can be seen in the ampulla.
2. Biopsy can be taken.
3. Assessment of duodenal obstruction due to duodenal growth or infiltration of duodenum by carcinoma of head of pancreas.

4. **ERCP- Endoscopic retrograde cholangio pancreaticography**

1) Using the endoscopic approach ampullary and duodenal carcinoma can be visualized and biopsy can be taken.

2) If not able to take biopsy, with brushing of tumor, cytological examination can be made.

3) Abrupt tapering of both ducts (**double duct sign**) is highly suggestive of periampullary carcinoma.

4) A biliary stent can be placed through the obstructing lesion in the bile duct by endoscopic approach to alleviate jaundice.
5) We can accurately stage the tumor by doing endoscopic ultrasonography.

RADIOLOGICAL WORK UP.

I Barium Meal

1. In carcinoma of the head of pancreas, it shows widening of the C-loop of the duodenum. It is called as ‘pad’ sign.
2. In carcinoma of the ampulla of vater, Reversed ‘3’ appearance can be seen.
3. Delayed gastric emptying and duodenal obstruction can be diagnosed.

Nowadays, barium meal is usually not done due to the advent of endoscopy and availability of other modalities of investigations like USG and CT scan. But if the patient is presenting with vomiting and OGD scopy showing no obstruction. we can still do Barium meal to detect delayed gastric emptying due to duodenal obstruction.

II. Hypotonic duodenography.

A double lumen tube (Gastro duodenal tube-**scott Harden**) is passed into the duodenum. 20-40 ml of thin barium solution is passed through it. 4 mg of antrenyl was given intravenously to render the duodenum atonic, and air is

insufflated. Then X-ray is taken. It gives a clear outline of the viscera. When carcinoma of head of pancreas has infiltrated the duodenal wall, it gives the appearance of Spiculation of rose thorn.

III.ULTRASONOGRAPHY

a. Transabdominal

This is a painless, harmless, non-invasive procedure which is relatively inexpensive and preferred investigation in jaundiced patients. It is widely available and entirely operator dependent with sensitivity of 80%-95%.

The findings are intra and extra hepatic biliary ductal dilatation, distended gallbladder, hypodense or isodense lesion in the head of pancreas, Secondary deposits in the parenchyma of liver and ascites.

b. Endoscopic Ultrasonography (EUS)

1) It employs a 7.5 – 12 MHZ transducer mounted on an endoscope to produce high resolution images. The pancreatic head and distal CBD are visualized from duodenum.
2) Recommended only for patients in whom pancreatic mass is suspected but can't be confirmed by helical CT or ERCP.
3) Useful in detecting small pancreatic lesions (<2cm) and also lymphnode and vascular involvement.
4) Useful in evaluation of ampullary tumors with respect to invasion of duodenal wall, pancreas & vascular invasion & encasement.
5) Experience with this technique, which is operator-dependent is still limited, precluding its widespread use.

6) Normal pancreas is seen as having a homogenous echopattern slightly brighter than that of the liver. The features of the carcinoma pancreas are inhomogenous and echopoor pattern, irregular outer margins, and the presence of tumorous pseudopodia.

c. Pancreatic duct Ultrasonography

With use of a small ultrasound transducer passed through the biopsy channel of duodenoscope and into pancreatic duct, the duct was evaluated. It is useful to differentiate Chronic pancreatitis from pancreatic carcinoma.

IV. CT Scan

Dynamic contrast enhanced spiral CT Scan detect lesion about 2cm in size.

1. It has an accuracy of 97% in detecting the presence of tumor.

2. The CT Criteria of unresectability are local tumor extension beyond the confines of the normal gland, invasion of contiguous hollow or solid organs, circumferential or contiguous tumor involvement of major extrapancreatic arteries or/and veins, hepatic or lymph node metastases and ascites.

3. Although, CT Scanning is a specific modiality for determination of unresectability for pancreatic carcinoma. It does not accurately identify patients with resectable lesion.

4. In approximately 40% of cases, CT Scan evaluation alone under estimates the extent of lesion.

V. MRI

Ultra fast MR imaging, including MR cholangiopancreatography, angiography, MR with Echoplanner imaging, may replace ERCP, in near future.

VI. Laparoscopy

This is an additional staging modality to evaluate periampullary patients before they are subjected to laparotomy.

1) Can pick up small liver or peritoneal metastases, which are usually missed by CT Scan.
2) Irrigation of peritoneal cavity can be performed and washings analysed cytologically for evidence of shed malignant cells.
3) Palliative Stent can be placed in inoperable cases, as a therapeutic measure.
4) **Laparoscopy contact USG** is the newer diagnostic method used to decide the diagnostic dilemma cases for surgery.
5) Combination of dynamic CT and Laparoscopic staging has an accuracy of >90% in predicting resectability.

VII. Biopsy and FNCA

Diagnosis is confirmed by taking biopsy from the periampullary growth via an endoscope. In a palpable mass, we can do CT or EUS guided FNAC. But FNAC is not used for potentially resectable tumors, because negative result does not rule out carcinoma and the fear of shedding of the tumor, either along the needle tract or into the peritoneal cavity.

For resectable lesion, Preoperative FNAC is of no additional value except when preoperative neoadjuvant chemo or radiation is contemplated.

For irresectable cases, percutaneous FNAC has a role in proving diagnosis before consideration of Palliative chemoRT.

VIII. Estimation of CA – 19-9.

- Normal Value < 35 U/ml
- In Pancreatic Cancer > 100 U/L (in 73% of patients)

It has a sensitivity and specificity approaching 90% for tumors arising in the pancreas. It is useful for prognosis and follow up surveillance.

IX. Angiography

Preoperative visceral angiography with arterial injection of celiac & SMA with venous phase studies provides the best demonstration of vascular anatomy, major vessel encasement or occlusion. It will also detect anatomical variations, such as a replaced right hepatic artery or Atherosclerotic stenosis or celiac axis.

PREOPERATIVE STAGING

Preoperative staging is more useful for pancreatic tumors than for other forms of periampullary cancer, since resectability for the latter lesions is usually significantly higher at the time of presentation than it is for pancreatic cancer. In many patients, dynamic spiral CT with oral and intravenous contrast will provide all the information necessary by demonstrating liver metastases or major vascular invasion.

Preoperative visceral angiography with arterial injection of the celiac and superior mesenteric arteries with venous phase studies provides the best demonstration of vascular anatomy and major vessel encasement or occlusion.

Visceral angiography also will detect anatomic variations, such as a replaced right hepatic artery or atherosclerotic stenosis or occlusion of the celiac axis that may alter operative management. Angiography is indicated, however, in these patients to rule out involvement of the superior mesenteric and portal vein and/or celiac axis.

Endoscopic ultrasonography is to detect small pancreatic lesions (<2 cm) and also lymph node and vascular involvement. This technique is also particularly useful in the evaluation of ampullary tumors with respect to invasion of the duodenal wall and pancreas.

A recent study in preoperative patients suggested that endoscopic ultrasound examination was superior to conventional sonography.

Liver metastases and peritoneal implants are the common sites of spread of periampullary carcinoma. Once distant metastasis present, survival is so limited that a conservative approach is indicated.

The technique of diagnostic laproscopy, before the patient is subjected to laparotomy, has been used by several groups as an additional staging modality for the evaluation of patients with pancreatic and periampullary malignancies.

The information gained from preoperative staging provides a basis for planning for each individual patient. If preoperative staging with CT, angiography, and laparoscopy is normal, resectability rates may approach 90 % for tumors of the head of the pancreas. Preoperative staging, therefore, results in a considerable improvement from previous resectability rates of less than 25 %, and thus eliminates the need for an unnecessary operation in a large number of patients.

TREATMENT OF PERIAMPULLARY CARCINOMA

Treatment of periampullary carcinoma depends upon the stage at presentation and presence or absence of comorbid medical conditions influencing treatment modalities.

Surgical resection of the tumor currently provides the only opportunity for cure in these patients if the tumor is resectable.

If the patient is presents with unresectable tumor with jaundice, with or without hepatic secondaries, we can do palliative biliary enteric and Gastrojejunal anastomosis, if there is no other comorbid medical diseases contraindicating the surgery. If the patient is medically unfit for surgery an endoscopic stenting may be done.

A patient with widespread metastatic disease, does not need any type of surgery because median survival is short. In these patients, palliative endoscopic biliary stenting can be done to relieve the jaundice. If the patient has unresectable tumor with severe pain, celiac axis block, either percutaneously or during laparotomy, can be done.

PREOPERATIVE PREPARATION

If the surgery is planned, whether it is curative or palliative, it is important to optimise cardiac, pulmonary, and renal function preoperatively, as in all patients about to undergo major surgery.

Because obstructive jaundice can cause defects in hepatic, and renal function**,** it is important to correct all these abnormalities preoperatively if they are present.

1. Correction of anemia with preoperative blood transfusion.
2. All patients are adequately nourished with high allowance of carbohydrate diet.
3. If there is dehydration due to vomiting in patients with duodenal obstruction, It is corrected by administration of intravenous fluids.
4. If there is duodenal obstruction, stomach wash should be given with normal saline.
5. Correction of disorders of coagulation

   The coagulation defect encountered in patients with obstructive jaundice is prolonged prothrombin time, resulting from deficiency of Vitamin K dependent clotting factors due to malabsorption of this vitamin.

   It is corrected by administration of intramuscular injection of phytomenadione (Vit K) for 1-3 days or with blood and fresh frozen plasma transfusion.

6. Prevention of renal failure

Cholemia and liver damage per se are associated with adverse effects on renal structure and function, and on circulatory haemostasis and on the integrity of the

gastrointestinal barrier. Even in the absence of infection, endotoxemia is frequently present in jaundiced patient where it results from the absorption of endotoxin produced by the intestinal microflora. Therefore, the patients with obstructive jaundice have an increased risk of Postoperative acute renal failure.

- Two pints of 10% Dextrose infusion given every day prior to surgery minimum for 3 days.
- Mannitol may be given on the day before, during and the day after surgery. It protects the kidneys by acting as an osmotic diuretic and by increasing the renal perfusion.
- Oral Lactulose to reduce the intestinal absorption of endotoxins from the intestinal microflora.
- All patients undergoing surgery should be catheterized and the urint output measured hourly. Further administration of diuretic is indicated if the urine output falls consistently below 40ml/hr.

WHIPPLE'S PANCREATICODUODENECTOMY

Step 1

- upper midline/subcostal incision .

- inspect liver & peritoneal surfaces. Biopsy /frozen section of suspected area
- regional nodes are inspected (periaortic lympnodes of the coeliac axis indicates tumor is beyond the limits of resection)
- once distant metastsis are ruled out, assess local resctability.
- positive nodes within the planned field of resction are not considered a contraindication to curative surgery

Step 2

The hepatic flexure of colon is mobilized from its retroperitoneal attachment, giving access to the 3 & 4 portions of the duodenum. Extensive mobilization of right colon & small bowel mesentry (**Cattell-Braasch maneuver**) is unnecessary except for lesions involving the fourth portion of duodenum, or for the approach to mobilization and resection of segment of SMV. The duodenum and head of pancreas are separated from the retroperitoneal bed medially past aorta and distally to the ligament of Treitz.

Step 3

The gallblader is removed and the bileduct is dissected free from adjacent portal structures and divided above the entry to cystic duct across the common hepatic duct (because of tendency of periampullary cancers to infiltrate cephlad along the submucosal lymphatic channels of bile duct).

The distal bileduct orifice is sutured to minimize spillage of tumor cells, but no clamp is used on the proximal bile duct, to avoid trauma to the duct. If evidence of unresectable cancer is discovered later in the operation, the proxial duct is used for palliative bypass. The tissues lateral to portal vein are carefully separated and divided, with additional care taken to be sure that a replaced aberrant right hepatic artery of the SMA is not included.

Step 4

The portal dissection is continued down along the anterior aspect of the portal vein, beginning with development of the tunnel in front of the vein and behind the neck of pancreas. Division of right gastric artery & gastroduodenal artery enlarges this window. Division of these vessels facilitates dissection of portal vein behind pancreas. The middle colic vein and gastroepiploic vein can be traced down to SMV for rapid identification. (Periampullary tumors are much more likely to involve the lateral & posterior aspect of portal /mesenteric vein)

Step 5

After dividing the left gastric & gastroepiploic vessels at the gastric wall, the stomach is divided across the proximal antrum. Alternatively, the duodenum 2 cm past the pylorus may be divided

Step 6

After the pancreatic neck has been carefully dissected from anterior surface of portal-superior mesenteric vein, a penrose drain is placed behind the neck to elevate and protect the portal vein during division. Four hemostatic sutures are placed on either side of the transection line. The pancreas is now ready to be divided with electrocautery.

Step 7

Ligament of Treitz is taken down in its entirety and the jejunum is divided 6 to 10 cm past the ligament. The jejunal vascular branches are divided at the bowel wall along the inner curvature.

Step 8

The final step in removal of the specimen is to divide the venous tributaries of SMPV and dissect along the lateral margin of the SMA, taking both arterial branches & the periarterial soft tissues, which include both lymphatics & nerve plexuses that can contain tumor.

Step 9

Pancreaticojejunostomy is performed first. The anastomosis is created in two layers, end - to - side, duct- to- mucosa, using an outer row of interrupted, non-absorbable 3-0 sutures that includes most of the cut surfaces of pancreas & an inner row of 4-0 interrupted synthetic absorbable sutures duct- to –mucosa. When the pancreatic duct is small or normal in size, a 5F feeding tube is placed in the pancreatic duct and brought out through the jejunum.

Step 10

10 cms distal to the pancreatic anastamosis, an end –to- side hepaticojejunostomy is made with a single layer of interrupted closely spaced synthetic absorbable sutures. A small (8 to 12 F) catheter can be left through the anastamosis & brought out distally through jejunum.

Step 11

After fixing the jejunal loop to the transverse meso colon with interrupted nonabsorbable sutures, GI continuity is restored with a retro-colic Hofmeister-type Billroth II gastrojejunostomy. This anastamosis is made with running absorbable sutures as an inner layer and interrupted nonabsorbable sutures as an outer layer.

Step 12

Soft closed-suction drains are placed in the right upper quadrant, anterior and posterior to biliary and pancreatic anastamoses. These are brought out through separate incisions in the right side of the abdomen. The abdominal wall is closed in layers.

POST OPERATIVE CARE

The nasogastric tube is discontinued on postoperative day 1 and clear liquids may be allowed on day 2. The diet is advanced to low-fat soft solids in frequent small feedings as tolerated. Blood glucose should be monitored and diabetes treated as appropriate. The concentration of amylase with closed- suction drainage is measured on day 5 or 6 when the patient is eating. If there are no indications of an anastomotic leak, the drains are removed on the sixth and seventh

days. The pancreatic (and biliary) stents are removed at the post-operative visit, generally at 2 to 3 weeks.

Pancreatic leak / fistula remain the most common serious complication of this operation. The mainstay of treatment is complete drainage of pancreatic leaks, either by closed-suction drains placed at operation or by percutaneously placed catheters if leak appears is delayed. The catheters should be left in place long enough to ensure formation of a secure tract and then withdrawn in segments to allow the tract to close behind as drainage closes. In the case of low-volume fistulas (less than 200 ml per day), patients may eat and be discharged to home. High output fistulas may require a more aggressive approach with fasting, maintenance of fluid and electrolyte balance, and parenteral nutrition. Octreotide 200 units subcutaneously three times a day has been used as an adjunct to reduce fistula volume, but there is no clear evidence that closure is accelerated.

In the event of delayed gastric emptying for more than 7 to 10 days, a gastrografin contrast upper GI study should be performed to rule out mechanical obstruction. In most cases the condition resolves spontaneously, although the gastroparesis can persist as long as 3 to 4 weeks. Management consists of support.

PALLIATION OF OBSTRUCTIVE JAUNDICE-

Options for establishing biliary decompression are divided into endoscopic, radiologic and surgical approaches. Patients with histologically proven unresectable disease are most commonly treated by endoscopic or radiologic

biliary stent placement. The sequence of palliative intervention is determined by the method used for cancer staging: laparotomy versus laparoscopy.

For patients undergoing laparotomy, surgical bypass is a reasonable option in the presence of obstructive jaundice, and the feasibility of the procedure should be guided by the findings at surgery; prophylactic bypass in these patients is controversial but should be tailored to an individual patient's needs.

For patients undergoing laparoscopy, biliary decompression endoscopic stent placement is recommended; if not successful or unavailable, then the radiologic PTH stent placement should be performed to avoid laparotomy.

In patients who develop recurrent obstructive jaundice following failure of the initial stent or because of progressive tumor radiologic PTH placement of expandable metallic wall stents under imaging control may then be indicated.

Palliation of gastric outlet obstruction

The management of pancreatic cancer patients with the potential to develop gastric outlet obstruction (reportedly 3%—9%) is predicated on the initial surgical staging technique (laparotomy versus laparoscopy).

Patients with equivocal or potentially resectable disease, who undergo laparotomy, can be assessed for duodenal involvement or impending obstruction from the tumor during the surgery. Guided by the operative assessment, gastrojejunostomy can be performed effectively. Routine prophylactic gastric bypass in staging laparotomy has been historically advocated; however, the need for the procedure should be based on the individual patient's needs.

Patients with histologically confirmed unresectable disease and those undergoing staging laparoscopy rather than laparotomy for equivocal or potentially resectable pancreatic cancer are reasonably managed without prophylactic gastric bypass. If the patient develops subsequent obstruction, then gastric decompression can be achieved by several different methods, guided by the individual patient's condition.

Patients with good performance status, who are expected to have an extended survival, should undergo gastric bypass, preferably laparoscopically, or by laparotomy. For patients developing gastric outlet obstruction as a near-terminal event, then endoscopic gastrostomy tube or expandable duodenal stent placement should be considered.

Palliation of pain

Standard narcotic analgesics are inadequate for most patients with pancreatic malignancy. Percutaneous celiac blockade for patients with histologically proven unresectable disease, who do not undergo laparotomy, is a logical approach (those undergoing laparotomy should be considered for intraopetative celiac blockade). Patients who obtain only short-term analgesia or fail to achieve pain relief from the percutaneous or laparotomy approaches should be considered on an individual basis for video-assisted thoracoscopic nerve transection

NEOADJUVANT AND ADJUVANT THERAPY

Adjuvant chemoradiation therapy generally comprises external beam radiation therapy.

The theoretical advantages of neoadjuvant chemotherapy for patients with resectable pancreatic cancer are (1) it may be more effective to give radiation in well- vascularized tissues. (2) Previously unresectable tumors may become resectable, and (3) it may improve patient selection, preventing unnecessary laparotomies in patients with evidence of disease progression on neoadjuvant therapy (which occurs in approximately 20 % of patients). Despite these theoretic advantages, however, neoadjuvant therapy has not been shown to be superior to adjuvant therapy.

Adjuvant intraoperative electron beam radiation therapy (IORT), which delivers a single dose of 10 to 20 grays to the tumor bed at the time of resection, has therefore been used, alone or in combination with standard chemoradiation protocols to improve local control. In patients receiving neoadjuvant or adjuvant chemoradiation, tumor recurrence patterns change from locoregional failures to systemic failures, with liver metastases becoming the predominant site of metastasis.

Thus more effective systemic agents are needed. One such potential agent is **gemcitabine** (2' – deoxy-2'2'-difluorocytidine, Gemzar), a deoxycytidine analog capable of inhibiting DNA replication and repair.

Gemcitabine is also a potent radiation sensitizer and is being combined with EBRT using a variety of treatment schedules in patients with advanced pancreatic cancer.

PREDICTORS OF SURVIVAL AMONG PERIAMPULLARY CANCERS

Survival Differences versus Cancer Stage

Local Growth Pattern

Early vs Late Jaundice

Patients with cancers directly involving the distal bile duct should present with jaundice at an earlier stage of disease. Current data suggest that most ampullary, duodenal, and distal bile duct tumors present without lymph node metastases, and consequently when resected are associated with a better prognosis than pancreatic cancer. Although bile duct cancers should present early and should be associated with a prognosis equivalent to ampullary cancers, the fact that survival is not equivalent suggests that other tumor subtype factors are involved. Clearly, the T stage of pancreatic cancer that obstructs the bile duct by extension

from the pancreatic duct with encasement or invasion must be more advanced than the other periampullary cancers.

Factors

Focal growth patterns of the primary periampullary cancers likely contribute to outcome. Although initially all periampullary cancers arise intraluminally from mucosa, subsequent invasion of duct or gut wall carries different implications.

Intraluminal Growth

Biologic behavior among periampullary cancers is also manifested in their direction of growth. Intraluminal growth is present in 40% of ampullary cancers but in only 2% of pancreatic cancers and is followed by extraductal invasion in 60% of the ampullary cancers and 98% of the pancreatic cancers. Adjacent tissue invasion represents advanced T stage of disease, and therefore, a poorer prognosis with an increased rate of invasion of lymphatic, venous, and perineural structures.

When an nonpancreatic periampullary cancer invades the pancreatic parenchyma, the prognosis worsens (similar to the pancreatic counterpart), and the frequency of lymphatic involvement increases significantly. Invasion of ampullary cancers into the duodenal wall does not have the same adverse impact as does pancreatic invasion. Clearly, pancreatic invasion or origin portends a poor prognosis. Similar findings for the relationship of T stage for duodenal cancers and prognosis have been reported.

Lymphatic and Neural Spread

Lymphatic Spread. Lymphatic metastases represent an advanced disease stage. In fact, some authors maintain that lymphatic invasion is equivalent to established lymphatic metastases. Pancreatic cancers present with lymph node metastases in 56% to 79% of patients, ampullary cancers are associated with lymphatic metastases in 30% to 50%, and bile duct cancers in 56% to 69%. The frequency of lymph node metastases is significantly increased when nonpancreatic periampullary cancers invade the pancreas, which is especially reflected in para-aortic lymph node metastases.

Ampullary tumors often have limited nodal involvement. These cancers usually involve the posterior pancreatoduodenal nodes (“first echelon”) and seldom the nodes located to the left of the superior mesenteric artery and the celiac ganglion. In contrast, the nodal involvement in pancreatic cancer is more extensive and clearly involves both the above nodal groups. Shirai et al showed an increased survival after pancreaticoduodenectoimy and radical lymphadenectomy in

ampullary tumors, which supports further evaluation of this aggressive approach even in the presence of lymphatic spread.

Duodenal tumors behave biologically differently than pancreatic cancers. There is 36% to 47% incidence of positive lymph nodes in pancreaticoduodenec - tomy specimens. Despite this frequency of nodal involvement, however, 5-year survival rate approaches 40% to 50%. In contrast, the presence of positive lymph nodes in patients with pancreatic cancer is associated with a 5-year survival of only 5% These findings justify a role for aggressive resection in duodenal and ampullary cancers, even in the presence of positive lymph nodes.

Perineural Invasion. Perineural invasion, especially extrapancreatically, is an important prognostic factor associated with pancreatobiliary tract cancer and generally denotes a poor prognosis. Most patients with pancreatic carcinoma have perineural invasion (concomitantly with lymphatic vessel invasion). This feature of pancreatic cancer may contribute to the high incidence of local recurrence, especially retroperitoneally. In contrast, perineural invasion occurs in only 5% to 17% of patients with ampullary cancers, which has a lower local recurrence rate after resection. Interestingly, when perineural invasion is present with

periampullary cancers, the prognosis is similar to pancreatic cancers. Finally, although bile duct cancers are associated with a high (86%) incidence of perineural invasion, correlation with local recurrence has not been established because the frequency of positive post-resection margins is a confounding factor.

Molecular Concepts and Clinical Correlation

Duodenal and ampullary tumors have the best prognosis among periampullary cancers. They are similar in their genesis; some ampullary cancers may arise from the duodenal type of epithelium and hence they share some of the steps of the molecular development model. This fact is evidenced in the data by Zhu et al, where some genes, tumor markers, and expression of growth factors are present in similar percentage in both cancers. Other genetic alterations, like the mutation of the K-ras oncogene, are almost exclusive to pancreatic cancers among the periampullary cancers. Pancreatic cancers also express the receptor for EGFR, which is not expressed by other periampullary cancers and is associated with a much worse prognosis. Finally, some histologic similarities were found between bile duct and pancreatic cancers, traditionally the ones with the worst outcome.

Overall, it is impossible to point out a specific factor to explain the different outcomes of these cancers. The combinations of these features will ultimately determine the biologic behavior of each cancer.

Stage at Initial Presentation. Size of primary tumor, tumor histologic differentiation, lymph node status, and resection margin status are very important when defining poor prognostic factors. At presentation, pancreatic cancers have the highest frequency of these factors when compared with nonpancreatic periampullary cancers.

A higher incidence of positive margins after apparent curative resection in pancreatic cancer is a reflection of its usual early perineural invasion and accounts for its higher locoregional recurrence. The clinical correlation of decreased survival in pancreatic cancer is obvious after analysing the data.

INNOVATIVE STRATEGIES

Significant advances in understanding basic immunology have renewed interest in using immunotherapy to treat pancreatic cancer. Cancer immunotherapy, including humanized Monoclonal Antibodies, cytokines, and potent vaccine strategies, has been successful in animal models and is being evaluated in clinical trials.

Gene therapy is also being explored using methods to inactivate oncogenes, replace defective tumor suppressor genes, confer enhanced chemosensitivity to tumor cells, and increase immunogenicity of tumor cells.

Angiogenesis, an essential step in the growth and metastasis of pancreatic cancer, has been targeted by many antiangiogenic agents. Several clinical trials have been initiated to evaluate the role of these innovative strategies in patients with pancreatic cancer with increasingly sophisticated correlative studies to learn more about the mechanisms of tumor rejection with these agents.

The rapid translation of basic science discoveries to clinical trials should result in the development of new effective treatments for patients with pancreatic cancer.

KEY POINTS

Most of the Literatures support the clinical impression that periampullary cancers vary in outcome after resection.

Overall survival after pancreaticoduodenectomy is greatest for patients with ampullary and duodenal cancers, intermediate for patients with bile duct cancer, and least for patients with pancreatic cancer.

Moreover, survival for each tumor stage is greater for nonpancreatic periampullary cancers than for pancreatic cancers. Invasion of the pancreas by nonpancreatic periampullary cancers is a major factor adversely affecting survival.

Recent data suggest that inherent differences in tumor biology rather than embryologic, anatomic, or histologic factors probably account for these differences in survival.

Finally, although pancreaticoduodenectomy remains the procedure of choice for resectable periampullary cancers, further increases in survival will likely evolve through more effective neoadjuvant or adjuvant therapies rather than modification in the surgical approach.

MATERIALS AND METHODS

This work includes the study of 26 patients, with a diagnosis of periampullary carcinoma, who were admitted in the Thanjavur Medical College Hospital, Thanjavur, between June 2004 and October 2006.

The methods include obtaining the important informations from the patients, thorough clinical examination and doing the investigations whatever necessary to aid the diagnosis and resectability. All the informations were entered in a proforma specially designed for this study.

The patient's age, sex, symptoms and its duration were obtained. Personal history like smoking habits, alcohol consumption and their duration were noted. History of recent onset of diabetes mellitus, if present was noted.

In all these patients, nourishment and presence of jaundice were noted. Abdomen was examined to detect hepatomegaly, palpable gallbladder, ascites and mass. Rectal examination was done to find out rectovesical or recto vaginal deposits .

Respiratory system was examined to find out the pleural effusion. Enlargement of left supraclavicular node (virchow 's node) and umbilical nodule (sister mary joseph's nodule) if present, were noted.

Basic investigations like urine examination, Hb% estimation, Blood sugar and renal parameters like urea and creatinine were done in all these patients. liver function test like serum bilirubin, serum proteins, clotting time, serum alkaline phosphatase, liver enzymes and prothrombin time were also done.

Upper gastrointestinal endoscopy was done in all the patients and biopsy was taken if the growth was seen.

Initially, ultrasonogram abdomen was done in all patients, then CT Scan abdomen was done to confirm the diagnosis and to know the resectability. X-ray chest was taken to know the pulmonary metastases and pleural effusion.

Based on above investigations treatment was planned accordingly. If the patient was fit for surgery, either curative resection or palliative bypass procedure was done. If not, the patient was managed conservatively or referred to higher institutions for palliative endoscopic stenting.

Postoperative complications were noted and managed accordingly. Most of the patients who were operated were followed up in our review clinic.

OBSERVATION AND RESULTS

1. Incidence

Total of 26 cases were admitted in the period between June 04 to October 06, accounting for 1.15 % of all cancers, in TMCH (Total cancer case in this period - 2260)

Out of 26 cases 15 cases were carcinoma head of pancreas, accounting for the 58 % of total periampullary carcinoma.

7 cases (27 %) were carcinoma of the ampulla of vater

2 cases (8 %) of carcinoma of distal CBD

2 cases (8 %) of duodenal carcinoma

2. Age incidence

All the cases were in the age group of 31-70. Among this 17 cases (65 %) were in the age group of 40-59, 2 cases (8 %) were in the age group of 30-39 and 5 cases (19 %) in the age group of 60-69.

3. Sex Incidence:

There were 17 male patients (65 %) and 9 female patients (35 %) with a male: female ratio of 1.8 : 1

4. Symptomatology:

Pain

19 patients (73 %) were admitted with abdominal pain with a duration of 1 week to 4 months. In most of the patients the pain was in the epigastrium and mild to moderate in intensity.

Jaundice

22 patients (85%) were admitted with jaundice with a duration of 15 days to 7 months. Most of the patients with jaundice also had generalized pruritius and were passing clay coloured stools.

14 Patients (54 %) were admitted with weight loss.

12 patients (46 %) had vomiting

11 patients (42 %) were admitted with upper GI Bleed.

2 patients (8 %) had abdominal mass at presentation.

5. Smoking

14 patients (54 %) were smokers for more than 15 years of duration.

6. Alcohol Consumption

Only 4 patients (15 %) were chronic alcoholics for more than 15 years of duration.

7. Diabetes Mellitus

In this study 4 patients (15 %) had diabetes mellitus. Among this 2 patients (8 %) were admitted with recent onset of diabetes mellitus. Another 2 patients (8 %) were found to be diabetic which was confirmed by blood sugar levels.

8.Palpable Gallbladder

Only in 11 cases (42 %) gallbladder was palpable, Although distended gallbladder was detected by ultrasonogram in all cases (19 cases) which was later confirmed at laprotomy.

9.Hepatomegaly

Enlargement of liver was present in 19 cases (73 %) clinically. Among this 26 % had smooth enlargement, remaining 47 % cases had nodular enlargement. On USG, cases had liver secondaries in the latter group.

EXTENT OF DISEASE:

Extent of disease was evaluated by ultrasonogram, CT scan abdomen, Xray chest with clinical examination.

12 patients (46 %) had hepatic secondaries.

7 patients (27 %) had ascites.

2 patients (8 %) had pleural effusion

2 patients (8 %) had enlargement of left supra clavicualr lymph node.

8 patients (31 %) had duodenal obstruction.

CT SCAN ABDOMEN IN EVALUATION

Resectability at computed tomography was correlated with local surgical resectability in Carcinoma head of pancreas. Among the 14 patients who had resectable tumor after CT Scan evaluation, 6 patients had nonresectable tumor at laparotomy.

All the patients who had nonresectable tumor after CT scan evaluation, had irresectable tumor at laparotomy also.

SIZE OF THE TUMOR

The size of the tumors ranged from 2cms to 10cms, average being 5 cms. No patients with tumor smaller than 2 cms was seen in our study. The size of the tumor in a resectable carcinoma was 2.5cms – 3.5cms. No patients with tumor size of, more than 4cms had curative resection.

MANAGEMENT

After preoperative evaluation, 14cases were posted for surgery with curative intent, but resection was possible in only 8 cases. The remaining 6 cases had palliative surgery. 5 cases were evaluated to be unresectable preoperatively, and since their general condition was fit for surgery, Palliative bypass procedures were planned and done. Seven patients were not fit for any surgical intervention, So they were managed conservatively.

CARCINOMA HEAD OF PANCREAS

Among the 15 cases of carcinoma head of pancreas, 9 cases found to be resectable by preoperative evaluation, so posted for curative surgery. But on laparotomy, only 2 patients had resectable tumor and they underwent pancreaticoduodenectomy. Since, the other 4 patients were found to have local infiltration into vascular structures& fixity (unresectable), hence palliative bypass procedure done.

Liver metastases were detected, in the remaining 3 patients, and since these patients were fit for surgery, palliative bypass procedure was done.

Totally 7 patients (46.7%) underwent palliative bypass procedures. Among these 7 patients, 3 patients (20%) underwent choledochojejunostomy with jejunojejunostomy and 4 patients (27%) underwent Biliary bypass and Gastroenteric bypass.

4 patients (26.66%) presented with advanced stage of disease .so, they were not fit for any surgical intervention. Two cases (13.33 %) referred for stenting.

CARCINOMA OF AMPULLA OF VATER

Among the 7 cases, 5 cases (71.42%) underwent curative resection. 2 patients (28.57%) underwent palliative biliary bypass due to presence of hepatic secondaries.

CARCINOMA OF DISTAL CBD

Since both the patients had liver metastases but they were fit for surgery, palliative biliary and Gastroenteric bypass were done.

Duodenal Carcinoma

Among the admitted 2 patients, one patient underwent curative surgery, the other patient was medically not fit for any surgical intervention.

MANAGEMENT SUMMARY

Total patients were 26, Among these 26 patients, 8 patients(30.76%) underwent curative surgery. 11 patients(42.3%) underwent palliative bypass procedures. Among these, 5 patients (19.23%) underwent biliary bypass only and 6 patients (23.07%) underwent both biliary bypass and gastroenteric bypass.
7 patients (26.9%) had no surgical treatment. Among these 2 patients(7.69%) were referred for palliative endoscopic stenting and 5 patients (19.23%) had no surgical intervention due to poor general condition and also due to presence of an advanced disease.

POSTOPERATIVE MANAGEMENT

Curative cases:

Among 8 patients who had curative resection, 2 patients(25%) died postoperatively. Death were due to uncontrollable postoperative shock and myocardial infarction.

Among the remaining 6 cases, 3 cases had pancreatic leak(37.5%) and 2 patients had minor wound infection(33%) which were managed conservatively.

Palliative cases:

Among the 11 patients who underwent bypass procedures, 3 patients (27.3%) had wound infection, one patient (9.1%) had delayed gastric emptying and there was nil mortality.

FOLLOW UP

Out of 19 patients who underwent surgery, 2 patients died postoperatively. In remaining 17 patients, 8 patients turned up for review.

Curative cases:

Among the 6 curative patients, 2 patients were lost for follow up, the remaining 4 patients were periodically evaluated for local recurrence and or metastasis of disease.

Median survival of patients with pancreatic periampullary tumors are 9 to 12 months and non-pancreatic periampullary tumors are12 to 18 months.

Palliative cases:

Among the 11 palliative patients, 7 cases were lost follow up.

2 patients who underwent only biliary bypass were admitted with gastric outlet obstruction after 6 months and underwent gastrojejunostomy.

This group of patients have a median survival of 6 to 9 months.

Conservative cases:

Patients managed conservatively generally had an even shorter survival, less than 6 months.

DISCUSSION

Incidence

In both men and women, periampullary carcinoma represents 3 % of all cancers in the western world. India has the lowest incidence in the world (Muir C et al)

In study by **Shantha V et al**, the periampullary carcinoma accounted for 1.14 % of all carcinoma in men and women.

In our study, it is 1.15 % of all carcinomas. This may be due to low intake of fat, protein and low incidence of smoking in our country.

In a study by **Lyon JL et al**, there is a correlation between per capita saturated and total saturated fat intake and an increased risk of pancreatic carcinoma.

Age

The incidence is peak in the age group of 60 – 80, with more than 80 % of cases in the above age group (Gordis L et al and Morgan RGH et al).

In a study by **Shantha V et al**, 78.95 % of patients were in the age group of 40-69. Where as in our study, 84.61% patients were belongs to 40 to 69 age group.

In our population, the incidence of carcinoma was observed 2 decades earlier than western population.

Sex

In a study Akoik et al and Muir C et al, the male / female ratio was between 1.5:1 to 2:1.

In a study by Shantha V et al, the male / female ratio was 1.92 to 1. In our study, it was 1.8:1

SYMPTOMATOLOGY

The three main symptoms of periampullary carcinomas are pain, loss of weight and jaundice (Sir David C et al).

Jaundice

Since, the periampullary carcinoma, by definition, arises near the distal biliary tree, obstructive jaundice is the hall mark of presentation (Michael J.Zinner et.al).

In University of Mannheim study, 82 % of patients were presented with jaundice. In our study, it was 84.61 %.

The common misconception is that periampullary carcinoma is associated with painless Jaundice, when, infact, the overwhelming majority of patients had pain (JAMES.BARKIN et.al & A CUSCHIERI et al.) in our study 73.07 % patients had painful jaundice.

Pain

In University of Mannheim study, the pain was present in 75 % of patients. In our study, it was 73.07 %.

In the study by Ridder GJ et al, severe pain, that is due to infiltration of retroperitoneum, indicated the incurability.

In our study, the patients admitted with severe pain had advanced disease. No patient with resectable tumor had any severe pain.

Weight loss:

According to pereZ MM et al and petrek JA et al, if the patient is presenting with rapid weight loss, the tumor is less likely to be resectable. In our study, 14 patients with weight loss except one had irresectable tumor at presentation.

Vomiting:

Vomiting was present in 29 % of patients in University of Mannheim study. In our study, it was 46.15 % of which 31 % of due to duodenal obstruction.

Diabetes mellitus:

In a study by Rosa JA et al the newer onset of diabetes observed in 15 % - 20% of patients with pancreatic cancer , two years before tumor diagnosis.was made.

In a study by Guillo L et al, the prevalence of diabetes in pancreatic carcinoma is significantly greater than control. Glucose intolerance develops 6-12 months before diagnosis in 10-15 % of patients (Murr MM et al).

In our study, the prevalence of diabetes mellitus was 15.38 %. So diabetes mellitus of recent onset in non-obese individuals should raise the suspicion of pancreatic cancer and investigation should be done.

Smoking:

Smoking is the best established risk factor for pancreatic carcinoma (Kauppine T et al, Gold EB et al). There ia a dose relationship to the number of cigarettes smoked and the occurrence of carcinoma (Ablgren JD et al). In our study 54 % of patients were smokers for more than 15 years duration.

The study of Talamini G et al showed that 64 % of pancreatic carcinoma patients were smokers compared to 35 % of control.

Alcoholism

A cohort study by Zheng W et al, and a case control study, by Ji BT et al, showed that intake of alcohol was not associated with increased risk of pancreatic carcinoma. In our study, only 15 % of patients were alcoholics.

Palpable gallbladder

Although all cases had distended gallbladder in USG and in laparotomy. Only in 42 % of cases gallbladder was palpable clinically,in our study. According to Michael J.Zinner et al, and A cuschieri et al, 25 – 30 % of patients presented with palpable gallbladder.

So, all distended gall bladder may not be palpable in clinical examination and absence of palpable gallbladder in obstructive jaundice does not rule out the periampullary carcinoma.

Hepatomegaly

According to Michael U Zinner et al, and A cuschieri et al, 25 -30 % of patients present with nonmetastatic hepatomegaly. In our study, it was 26 %. It is probably congestive hepatomegaly due to biliary obstruction.

So presence of hepatomegaly in patients with periampullary carcinoma does not denote metastasis.

Extent of disease

Liver metastases are present in 50 % of cases (Michael Trede, Dennis A casciato et al). In our study, it was 46.15 %.

Ascites is present in 25 % of cases (Dennis A. Casciato et.al). In our study it was 26.92 %.

At the time of presentation it is unusual to have patients with duodenal obstruction from the tumor , but 15% to 20% develop it sometime before they die (Tada Taka Yamada et al). In our study, it was 31% at the time of presentation.

Retrospective reviews of surgical series (Sarr MG et al, Singh SM et al, Watanapa et al. and prospective randomized trials of endoscopic palliation (Bornman PC et al, Dowsett JF et al, Shephard HA et al) have demonstrated that in 10% to 20% of patients with irresectable pancreatic carcinoma,will be presented with Late onset of gastric outlet obstruction which may require a gastrojejunostomy (Tada Taka Yamada et al)

. Prophylactic gastrojejunostomy is not associated with increased morbidity and mortality (Lillemoe KD, Sauter PK Pitt et al).

In our study, out of 11 cases of irresectable carcinoma, 2 cases developed gastric outlet obstruction. 6 months after the palliative surgery.

So it is necessary to do prophylactic gastrojejunostomy in patients with irresectable carcinoma undergoing palliative procedure to avoid the future surgery in these patients.

Size of tumor

The size of tumor in resectable carcinomas usually ranges from 2-3 cms. (Tsuchiya R et al, Trede M et al), In our study, it was 2.5 – 3.5 cm.

Tumors smaller than 2cm are infrequent (Hermanek P). In our study, No patients with tumor 2 cms were seen.

In autopsy series, the average size is 4-6 cm (Kloppel G et al, Morohoshi T et al, Cubilla AL et al). In our study average size of the tumor was 5 cms and no patients with tumor size more than 4cm had curative resection.

CT Scan Abdomen in evaluation of carcinoma

Before introduction of spiral CT, dynamic CT was regarded the best technique in staging of carcinoma head of pancreas with an accuracy of 90-100% for predicting irresectable tumors. (Reznek, Nghiem HV).

Sensitivity and specificity of CT scan for irresectability of carcinoma head of Pancreas were 56% and 87% respectively (Warshaw et al).

In our study, among the 14 patients who had resectable tumour after CT scan evaluation, 6 patients had non-resectable tumour at laprotomy.

EUS and laparascopic contact USG are emerging newer diagnostic modalities that are recommended to improve preoperative assessment of resectablity.

Location of Tumors

85% of Periampullary carcinomas arise from head of pancreas, 10% from ampulla of Vater and 5% from duodenum and distal CBD (David C. sabiston Jr).

In our study, 58% of carcinoma from head of pancreas, 27% from the ampulla of Vater, 8% from distal CBD and 8% of duodenum.

Management

Surgical resection by pancreatico-duodenectomy provides the only chance for cure for patients with periampullary carcinoma. However, 25% - 75% of

patients who undergo exploratory surgery with intention to perform a pancreatico-duodenectomy are found to have unresectable disease (Trede M, Singh SM et al, Sohn TA et al). Therefore, at the time of surgery, the surgeon must focus on appropriate palliation of disease.

In our study, 42.85% of patients who were posted for curative surgery, had unresectable tumor at laparotomy. In all these patients, there was local infiltration superior mesenteric vessels and portal vein, which was not identified preoperatively. The rest of 57.14% of patients underwent curative surgery.

In patients who had curative resection, 62.5% were ampullary tumors and 25% were carcinoma head of pancreas.

The reason for better resectability of carcinoma of ampulla of Vater is early diagnosis which is due to early development of jaundice which brings the patients in early stage for medical attention and treatment (Helmut Friess et al).

In study by Sohn et al, the carcinoma head of pancreas accounted for 94% of unresectable tumors, ampulla of Vater 2%, the carcinoma of duodenum 1% and carcinoma of distal CBD 3%.

In our study, the carcinoma head of pancreas accounted for 86.7% of unresectable tumors, ampulla of Vater 28.6 %, the carcinoma of duodenum 50%, and distal CBD 100 %.

POST OPERATIVE COMPLICATION

Curative cases

During the 1960's the operative mortality after pancreatico-duodenectomy was in the range of 22-40% with postoperative morbidity rates as high as 40% (Monge JJ et al, Lansing RN et al, Gilsdorf RB et al)

During last decade a dramatic decline in operative morbidity and mortality after the pancreatic-duodenectomy has been reported with operative mortality ranging from 2-3%(Grace PA et al, Braasch, Trede M, Cameron JL)

In our study there was operative mortality is 25%.The high operative mortality (25%) of our study may be attributable to various negatively or adversely influencing factors like lack of established medical / radiation oncology departments, low volume of cases done, the 'early learning curve' effect, and may be the still poorly understood phenomenon of 'Biological behavior'.

The study by Lieberman et al, showed that volume of cases done had the major impact on survival.

With better intensive care facilities and well equipped medical /radiation oncology departments, an established hepatobiliary unit, and hence a higher volume of cases, the mortality rates may decline, only to merit the higher process of surgical technique.

Complication rates following pancreaticoduodenectomy remain high, however usually in excess of 25-35%. Pancreatic fistula remains the most common

serious complication with its incidence ranging from 5-20% (Michael J Zinnner et al). In our study it was 37.5%.

Palliative cases:

The operative mortality (within 30 days mortality) following palliative bypass was 12% in Watanapa P et al study and 0% in our study.

In a study by Lilleomoe et al , the wound infection (10%) was the commonest complication of Bypass surgery, followed by delayed gastric emptying (8%.) In our study, the wound infection was 27.3% and delayed gastric emptying was 9.1 %

CONCLUSION

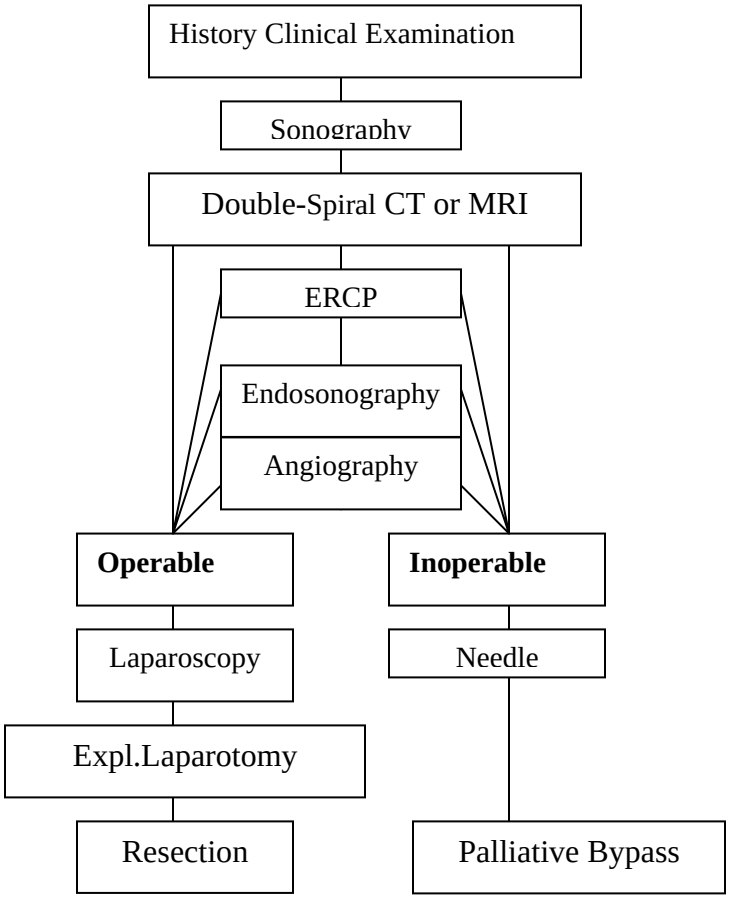
1. The incidence of periampullary carcinoma in our region was 1.15% of all carcinomas and carcinoma head of pancreas accounted for the majority.
2. There was slight male preponderance (Male to Female ratio 1.8:1)
3. Most of the Carcinomas occurred in the age group of 40-69.
4. Jaundice and abdominal pain were the most common presenting symptoms.
5. Recent onset of diabetes mellitus was present in 15.38% of the cases.
6. 54% of the patients were smokers for > 15yrs of duration.
7. Most of the patients who presented with weight loss and abdominal pain had unresectable tumor.
8. CT Scan abdomen was the modality of investigation to know the resectability.

9. Most of the patients were presented with irresectable carcinoma at presentation (Tumor resectability rate: 30.76%)
10. Size of tumor in patients who underwent curative surgery, was 2.5-3.5 cms. No patients with size of the tumor above 4 cm had resectable carcinoma.
11. The mortality rate of periampullary carcinoma in this study: 25% and anestamotic leak rate :37%.
12. Median survival of our patients who underwent curative resection for non - pancreatic periampullary lesion are 12 to 18 months and for pancreatic periampullary carcinoma are 9 to 12 months.

Epidemiology and Risk Factors in Pancreatic Cancer

Factors	Increased Risk	Possible Risk	Unproven Risk	Decreased Risk
Demographic	Advancing age Black race Male gender Jewish ethnicity	Geography	Socioeconomic status	
Host	HNPCC Familial breast cancer Peutz-Jeghers Ataxia-telangiectasia FAMMM Hereditary pancreatitis	Diabetes Chronic pancreatitis Endocrine tumors Cystic fibrosis Sex hormones Pernicious anaemia	Peptic ulcer surgery Cholecystevtomy	Tonsillectomy Allergic disorders
Environmental	Tobacco	Diet Occupation	Alcohol Coffee Radiation	

Algorithm for the staging of pancreatic tumors



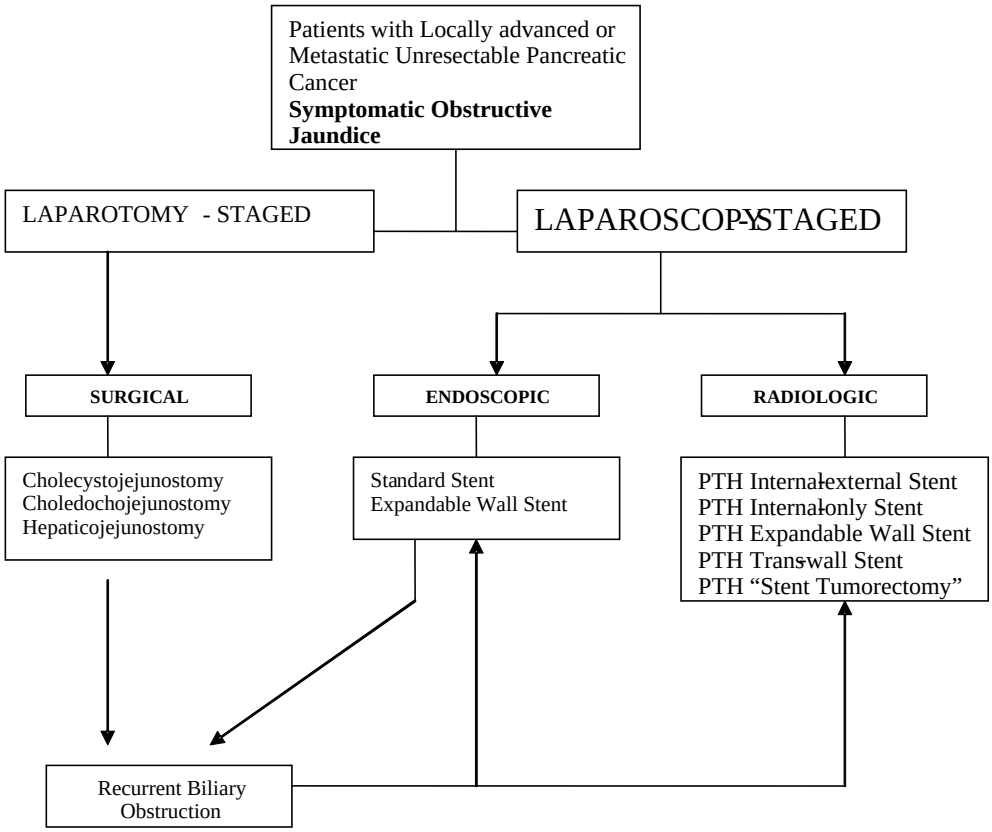
Complications of Pancreaticoduodenectomy

Common	**Uncommon**
Delayed gastric emptying	Fistula
Pancreatic fistula	Biliary
Intra-abdominal abscess	Duodenal
Hemorrhage	Gastric
Wound infection	Organ failure
Metabolic Diabetes Pancreatic exocrine insufficiency	Cardiac Hepatic Pulmonary Renal Pancreatitis Marginal ulceration

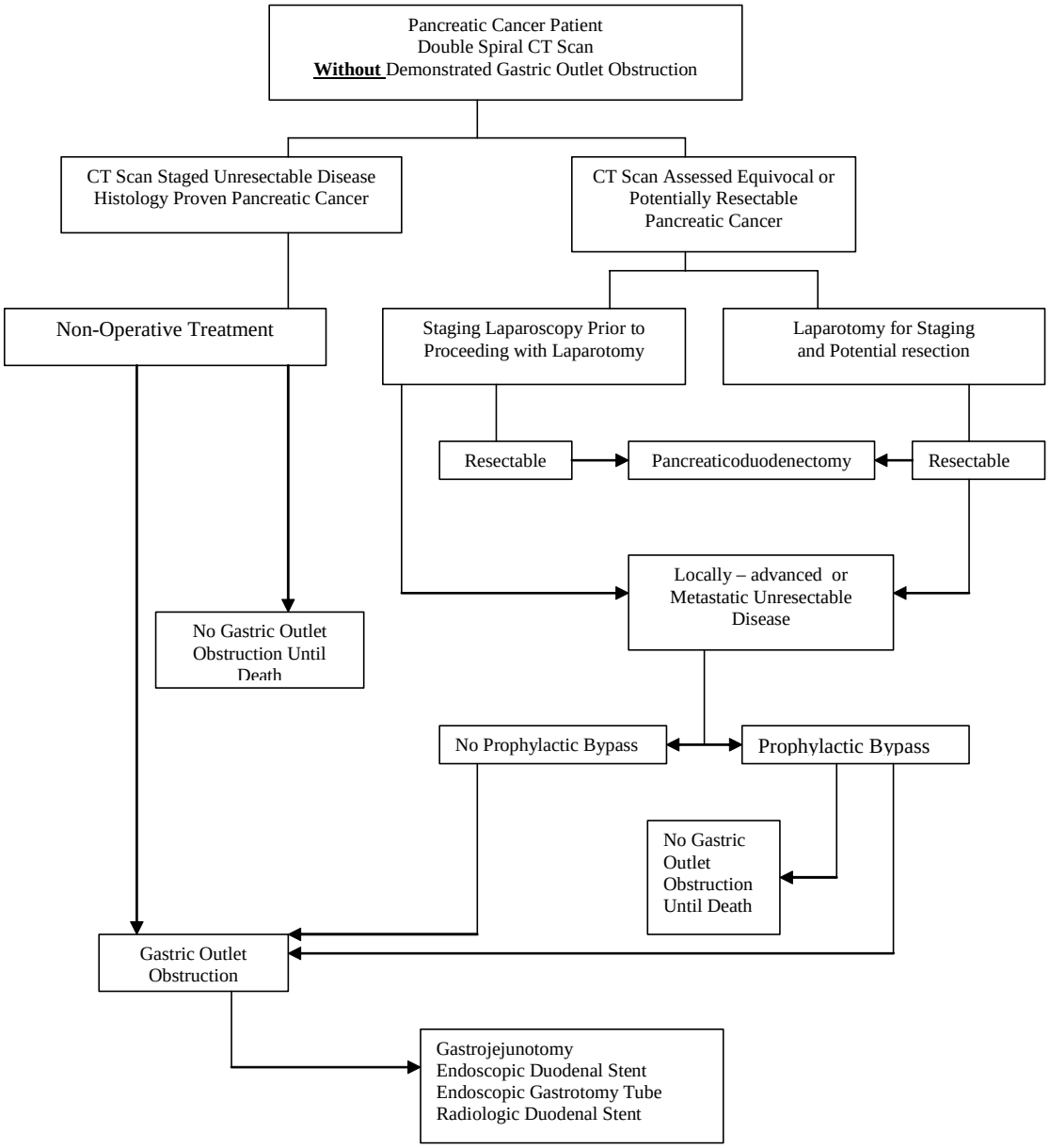
Complications of surgical palliation cases

Wound infection
Cholangitis
Delayed gastric emptying
Biliary anastomotic leak
CVS/RS/GUS complications

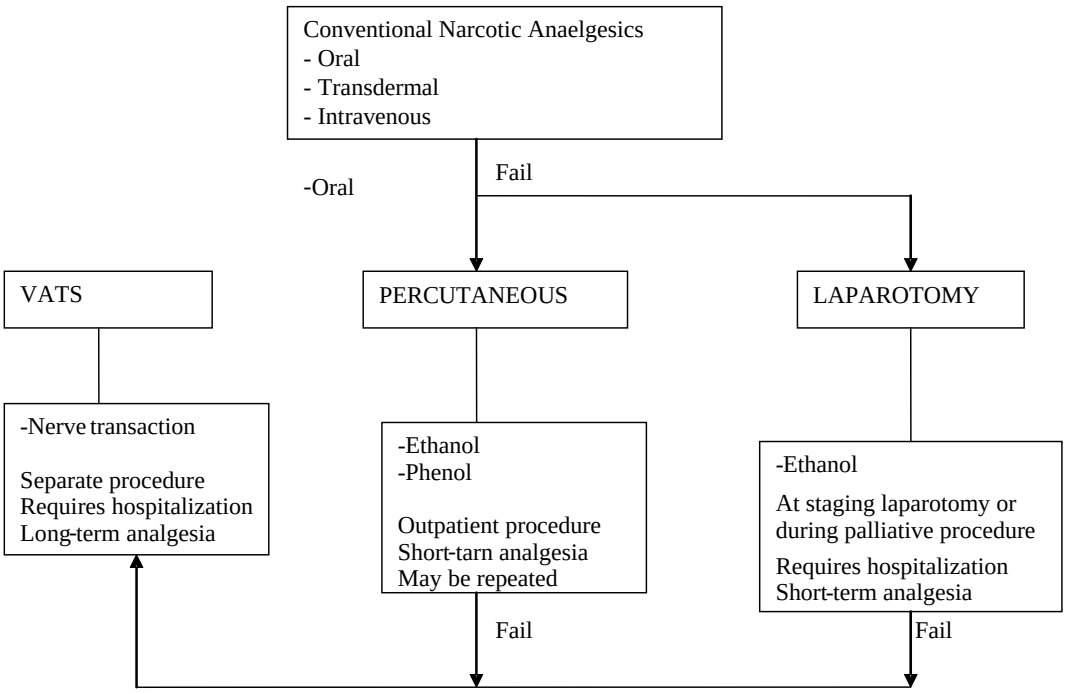
Algorithm for Palliation of obstructive jaundice



Algorithm for Management of Gastric outlet obstruction



Algorithm for management of pain



FINDING AT EXPLORATION

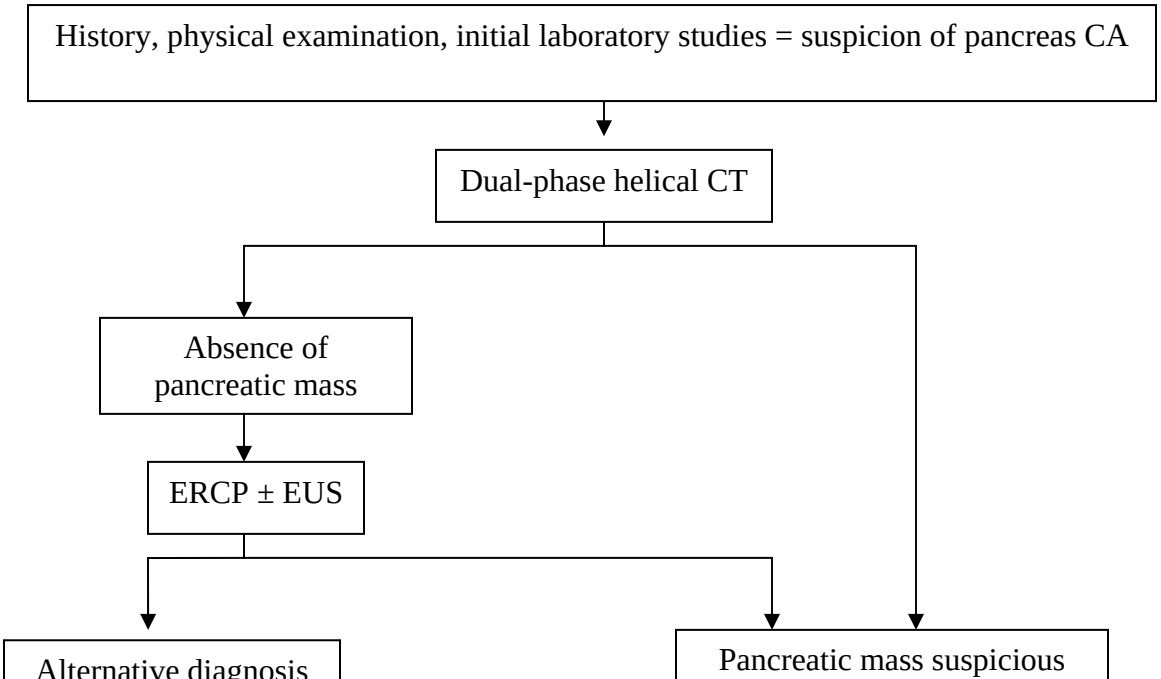
Findings contraindicating resection	**Findings not contraindicating resection**
Liver metastasis (any size)	Invasion at duodenum or distal stomach
Celiac lymph node involvement	Involved peripancreatic lymph nodes
Peritoneal implants	Involved lymph nodes along the porta hepatis that can be swept down with the

Invasion of transverse mesocolon Hepatic hilar lymph node involvement	specimen.

STAGE GROUPING

Stage	Grouping	Description
Ia	T1 No Mo	Tumor confined to pancreas
Ib	T2 No Mo	Tumor invades duodenum and / or bile duct outside pancreas no lymph node involvement
II	T3 No Mo	Tumor has not spread beyond duodenum or bile duct, but includes regional lymph nodes
III	Any T, N1 Mo	Locally advanced tumor growing into blood vessels, stomach, spleen, and colon, with or without lymph node involvement
IV	Any T, Any N, M1	Distant metastases (liver, lungs) present

Pre operative staging



INCIDENCE OF PERI AMPULLARY CARCINOMA

Periampullary Carcinoma	26	1.15 %
Other	2234	98.84 %
Total Cancers	2260	100 %

SITE OF CANCERS

Site Of Cancers	No. of Cases	Percentage
Carcinoma Head of Pancreas	15	57.69 %
Carcinoma of Ampulla of Vater	7	26.92 %

Carcinoma of Distal CBD	2	7.69 %
Duodenal Carcinoma	2	7.69 %
Total	26	100 %

AGE INCIDENCE

Age Group	No.of Cases	Percentage
<30	-	0
30-39	2	7.69
40-49	7	26.92
50-59	10	38.46
60-69	5	19.23
Above 70	2	7.69
Total	26	100

SEX INCIDENCE

Age Group	Male		Female	
	No.of Cases	Percentage	No.of Cases	Percentage
<30	-	-		-
30-39	1	5.88	1	11.11
40-49	5	29.41	2	22.22
50-59	6	35.29	4	44.44
60-69	3	17.64	2	22.22

Above 70	2	11.76	-	-
Total	17	100	9	100

SYMPTOMATOLOGY

Symptoms	No. of Patients	Percentage
Pain	19	73.07
Jaundice	22	84.61
Weight Loss	14	53.84
Vomiting	12	46.15
Upper GI Bleed	11	42.30

EXTENT OF DISEASE

Extent Of Disease	No. of Cases	Percentage
Liver Secondaries	12	46.15
Ascites	7	26.92

Pleural Effusion	2	7.69
Enlargement of left Supraclavicular Node	2	7.69
Duodenal Obstruction	8	30.76

TREATMENT OF CARCINOMA HEAD OF PANCREAS

Management	No. of Patients	Percentage
Curative surgery	2	13.33 %
Palliative Biliary Bypass	3	20 %
Palliative Biliary and Gastroenteric Bypass	4	26.66 %
Conservative	4	26.66 %
Referred for stenting	2	13.33 %
Total	15	

TREATMENT OF CARCINOMA AMPULLA OF VATER

Management	No. of Patients	Percentage
Curative resection	5	71.42
Palliative Biliary Bypass	2	28.57

MANAGEMENT OF PERIAMPULLARY CARCINOMA

Management	No. of Patients	Percentage
Curative Surgery	8	30.76
Palliative Biliary Bypass	5	19.23
Palliative Biliary and Gastroenteric Bypass	6	23.07
Referred for stenting	2	7.69
Conservative	5	19.23

Total	26	100

COMPARITIVE ANALYSIS OF AGE GROUP

Age group	Shantha V et al[79]	Our Study
<30	2.63	0 %
30-49	2.63	7.69 %
40-49	26.31	26.92 %
50-59	18.42	38.46 %
60-69	34.22	19.23 %

>70	15.49	7.69 %

COMPARATIVE ANALYSIS OF SYMPTOMATOLOGY IN UNIVERSITY OF MANNHEIM STUDY WITH OUR STUDY

Symptoms	**University of Mannheim Study**		**Our study**	
	No.of Patients	**Percentage**	**No.of Patients**	**Percentage**
Jaundice	332	82	22	84.61
Pain	301	75	19	73.07
Vomiting	77	29	12	46.15
Weight loss	346	85	14	53.84

Diabetes	9	2.2	4	15.38

COMPARATIVE ANALYSIS OF LOCATION OF TUMOURS

Location	**Sohn et al**	**Our study**
Head	70.22 %	57.69 %
Ampulla	10.78 %	26.92 %
Distal CBD	10.00 %	7.69 %
Duodenum	9.00 %	7.69 %

COMPARATIVE ANALYSIS OF UNRESECTABLE TUMOURS

Location	Sohn et al	Our study
Head of Pancreas	94 %	86.66 % (13/15)
Ampulla of Vater	2 %	28.57 % (2/7)
Duodenum	1 %	50 % (1/2)
Distal CBD	3 %	100 % (2/2)

COMPARATIVE ANALYSIS OF OPERATIVE MORTALITY

Author	Year	No.of Patients	Operative Mortality %
Grace	1986	45	2.2
Braach	1986	87	2.2
Trede	1990	118	0

Cameron	1991	80	1.3
Cameron	1993	145	0
Our Study (Different Surgeons)	2004 - 2006	8	25 %

THE TREATMENT OPTIONS FOR PERIAMPULLARY CARCINOMA

Curative resection

Whipple's pancreatico duodenectomy

Sphincter preserving pancreatico-duodenectomy

Palliative treatment

Relief of Jaundice

- Biliary enteric anastomosis
- Cholecystojejunostomy
- Choledochojejunostomy
- Hepaticojejunostomy
- Endoscopic Transhepatic stenting

Relief of duodenal obstruction

- Gastrojejunostomy

Relief of pain

- Analgesics, opiods
- Coeliac plexus block
- Cordotomy
- Extensive Sympathectomy

- Sterotactic thalamotomy
- Pancreatico gastrostomy over a T tube.
- Transthoracic splanchniectomy

DIAGNOSIS AND STAGING

Invasive

Sonography

- Laparoscopic
- Endoscopic
- Intraportal

Angiography

ERCP

Laparoscopy, including peritoneal cytology

Fine-needle cytology

Immunocytochemical examination of blood and bone marrow

Noninvasive

Transabdominal sonography

CT scanning (contrast enhanced, helical)

Ultra fast MR imaging, including

- MR cholangiopancreatography
- MR angiography
- MR with Echoplanar Imaging (EPI-MR)

Positron-emission tomography

Tumor marker: CA 19-9

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PERIAMPULLARY CARCINOMA – PROFORMA

Name	Ward / Unit
Age/Sex	D.O.A
Occupation	D.O.D
I.P.No.	D.O.S

DIAGNOSIS	

Complaints	**Yes/No**	**Duration**	**Complaints**	**Yes/ No**	**Duration**
Jaundice			Haemetemesis		
			Melena		
Pain			Clay coloured Stools		
Loss of Weight			Fever		
Vomiting			Anorexia		
Past History HT			TB		
DM			Previous Surgery		

Personal History

Diet	Smoking	Alcohol

Family History Socioeconomic status

General Examination

Built	
Nourishment	Pedal edema
Jaundice	Lymphadenopathy
Hydration	Anaemia

Vital Signs

Pulse: B.P: Temp: R.R:

Other Systems

Per-Abdomen

Gallbladder Liver Ascitis

PR: Rectal Deposit

Investigations

Urine-Alb		Sr.Na+	mEq/L
Sugar		Sr.K+	mEq/L
Urobilinogen		Sr.Protein(T)	g %
Bile Salts		A/G Ratio	
Bile Pigments		Sr.SGOT	U/L
Hb	g %	Sr.SGPT	U/L
Blood sugar	mg %	Sr.ALP	U/L
Blood Urea	mg %	CT	
Sr.Creatinine	mg %	BT	
Sr.Bilirubin	mg %	PT	Secs

X-ray Chest

Barium Meal Series

OGD-Scopy

USG-Abdomen

CT-Scan: Abdomen

Biopsy

Treatment: Conservative/Surgery

Surgery: Anaesthesia Incision

Findings Procedure

Complications

Follow-up

MASTER CHART

S.No	Name	Age	Sex	Ip number	Symptoms					DM	Smoking	Alcohol	Clinical Examinations				Lab Inves
					Jaundice	Pain	Vomiting	Weight loss	Malena				Gall Bladder	Smooth Liver	Nodular Liver	SCN	Haemoglobin
1	Narayanan	59	M	862415	+	-	-	-	-	-	-	-	+	+	-	-	10
2	Adaikappan	54	M	836558	+	-	-	-	-	-	+	+	+	+	-	-	9.6
3	Jeyaraman	53	M	913381	+	-	-	-	-	+	-	-	-	-	-	-	9.8
4	Marimuthu	47	M	907376	+	+	+	+	-	-	+	-	+	+	-	-	8.6
5	Saroja	45	F	901067	+	-	-	-	-	-	-	-	-	-	-	-	9.2
6	Samsulsudha	54	F	903906	+	-	-	-	-	-	-	-	-	-	-	-	10
7	Ammani	65	F	998063	+	-	-	-	-	-	-	-	+	+	-	-	8.8
8	Balamani	48	F	808810	-	+	+	+	+	-	-	-	-	-	-	-	9.4
9	Ramaiyan	48	M	888722	+	+	+	+	-	-	+	-	+	+	-	-	9.2

(Contd.)

Diagnosis	Preoperative Findings				Management	Complication	Follow up	S.No
	Size (cm)	HM or HS	A	Local Infiltration				
C.A.V	3	-	-	-	W.P.D	Wound infection	18 month	1
C.A.V	2.5	-	-	-	W.P.D	Panc. leak	12 month	2
C.A.V	3.5	-	-	-	W.P.D	Death	-	3
C.H.P with D.O	3.5	-	-	-	W.P.D	Panc. leak	9month	4

Duodenal Carcinoma	3.5	-	-	-	W.P.D	No complication	16month	5
C.A.V	3	-	-	-	W.P.D	Wound infection	Last follow up	6
C.A.V	3	-	-	-	W.P.D	Leak	Last follow up	7
C.A.H	4	-	-	-	W.P.D	Death	-	8
C.A.H with D.O	6.5	-	-	-	C.J &G.J	-	9 month Symptom free	9

S.No	Name	Age	Sex	Ip number	Symptoms					DM	Smoking	Alcohol	Clinical Examinations				Lab Inves
					Jaundice	Pain	Vomiting	Weight loss	Malena				Gall Bladder	Smooth Liver	Nodular Liver	SCN	Haemoglobin
10	Kaliaperumal	55	M	799161	+	+	+	+	+	-	+	-	-	+	-	-	7.8
11	Mani	49	M	840538	+	+	+	+	+	+	+	-	-	-	-	-	9.8
12	Ponnaiyan	58	M	804662	+	+	-	+	-	-	-	-	+	-	+	-	8.6
13	Babujohn	39	M	836146	+	+	+	+	+	+	+	+	-	-	+	-	8.2
14	Murugaiyan	45	M	838599	+	+	-	-	+	-	+	-	-	-	+	-	8.4
15	Kasinathan	40	M	762954	+	+	-	-	+	-	-	-	-	-	+	-	9.8
16	Lakshmi	65	F	835143	+	+	+	-	-	-	-	-	-	+	-	-	10.4
17	Vasantha	50	F	889385	+	+	+	-	+	-	-	-	+	-	-	-	9.6
18	Rukmani	54	F	816875	+	-	-	+	+	-	-	-	-	-	+	-	10.6

(Contd.)

Diagnosis	Preoperative Findings	Management	Complication	Follow up	S.No

	Size	HM or HS	A	Local Infiltration				
C.A.H with D.O	7	-	-	+	C.J & G.J	Wound unfection	9 month symptom free	10
C.A.H with D.O & D.M	8	-	-	+	C.J & G.J	Nil	Last follow up	11
C.A.H with HS	6.5	+	-	+	C.J & J.J	Nil	GOO After 6 Months	12
C.A.H with HS	8	+	-	+	C.J & J.J	Delayed Gastric empty	-	13
C.A.V with HS	6.5	+	-	+	C.J & J.J	Wound infection	Last follow up	14
C.B.D with HS	7.5	+	-	+	C.J &J.J	Nil	Last follow up	15
C.A.H with D.O	7	-	-	+	C.J & G.J	Wound infection	Last follow up	16
C.A.V with D.O	6	-	-	+	C.J & G.J	Nil	Last follow up	17
C.A.H with HS	6	+	-	+	C.J & J.J	Nil	Last follow up	18

S.No	Name	Age	Sex	Ip number	Symptoms					DM	Smoking	Alcohol	Clinical Examinations				Lab Investigati	
					Jaundice	Pain	Vomiting	Weight loss	Malena				Gall Bladder	Smooth Liver	Nodular Liver	SCN	Haemoglobin	Sugar
19	Aleemabeevi	56	F	878475	+	+	-	+	-	-	-	-	+	-	+	-	8.2	102
20	Gabriel	65	M	758436	+	+	+	+	+	-	+	+	-	-	+	-	9	78
21	Somasundharam	70	M	834897	+	+	-	+	-	-	+	+	-	-	+	-	9.8	120
22	Sivaraman	67	M	894564	-	+	+	-	+	-	+	-	+	-	-	+		
23	Natrajan	65	M	909865	-	+	-	+	-	+	+	-	+	-	-	-	10	150
24	Ramu	59	M	889822	+	+	-	+	-	-	-	-	-	-	-	-	10.4	64
25	Appakannu	76	M	910360	+	+	+	+	+	-	+	-	-	-	-	-	8.6	96
26	Murugamani	39	F	746597	-	+	+	+	-	-	-	-	+	-	-	+	6.4	78

DM : Diabetes Mellitus HS : Hepatic Secondaries
USG : Ultrasonogram
SCN : Supra Clavicular Node PE : Pleural Effusion
DO : Duodenal Obstruction
ALP : Alkalaine Phosphatase CAV : Carcinoma Ampulla of Vater
WPD : Wipple's Pncreaticoduodenectomy
CXR : Chest Xray CAH : Carcinoma Head of Pancreas

(Contd.)

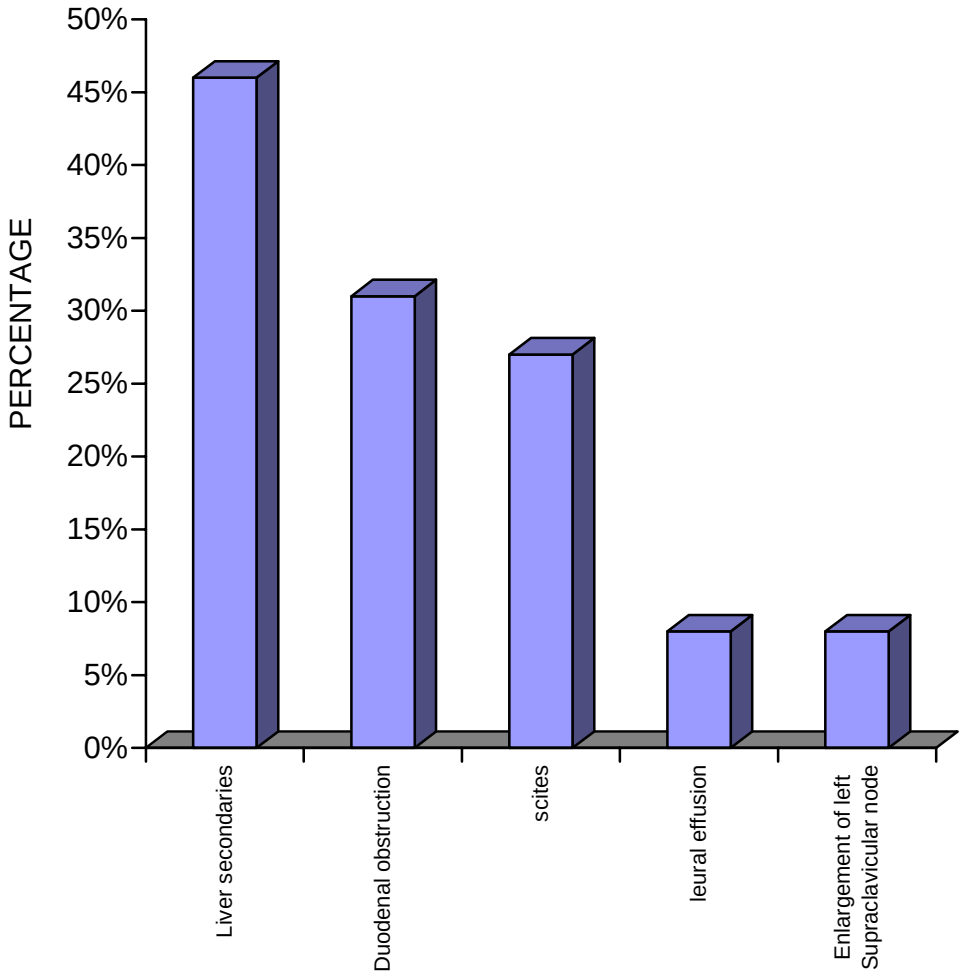
S.No	Diagnosis	Preoperative Findings				Management	Complication	Follow up
		Size	HM or HS	A	Local Infiltration			
19	C.B.D with HS	7	+	-	+	C.J &J.J		GOO After 6 Months
20	DC with DO & HS & A	-	-	-	-	Conservative	Referred for stenting	
21	C.A.H with HS & A	-	-	-	-	Conservative	Referred for stenting	
22	C.A.H with HS & A	-	-	-	-	Conservative		
23	C.A.H with HS & A	-	-	-	-	Conservative		
24	C.A.H with HS & A	-	-	-	-	Conservative		
25	C.A.H with HS & A & PE	-	-	-	-	Conservative		
26	C.A.H with HS & A & PE	-	-	-	-	Conservative		

CJ : Cholecysto Jejunostomy GOO : Gastric Outlet Obstruction

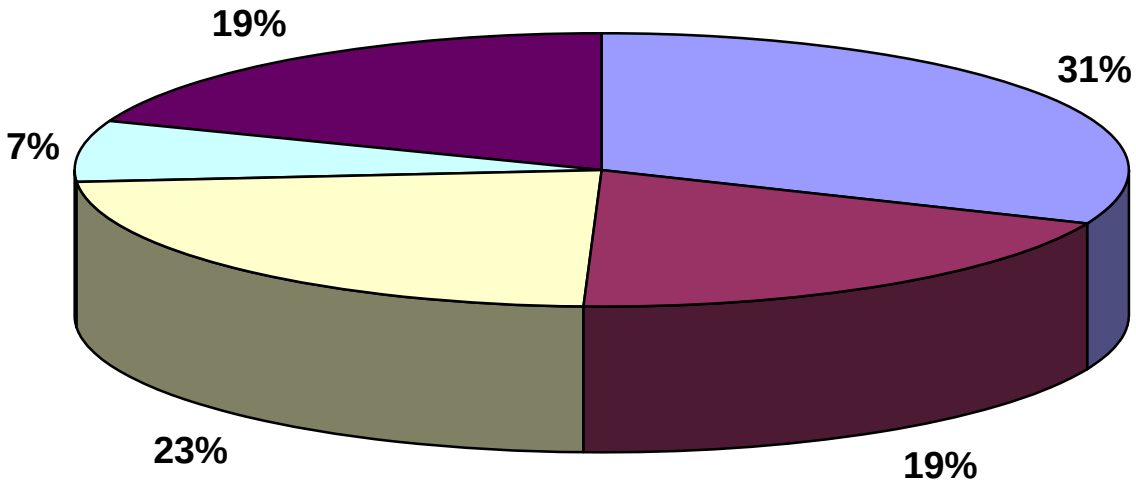
JJ : Jejuno Jejunostomy CBD : Common Bile Duct

GJ : Gastro Jejunostomy

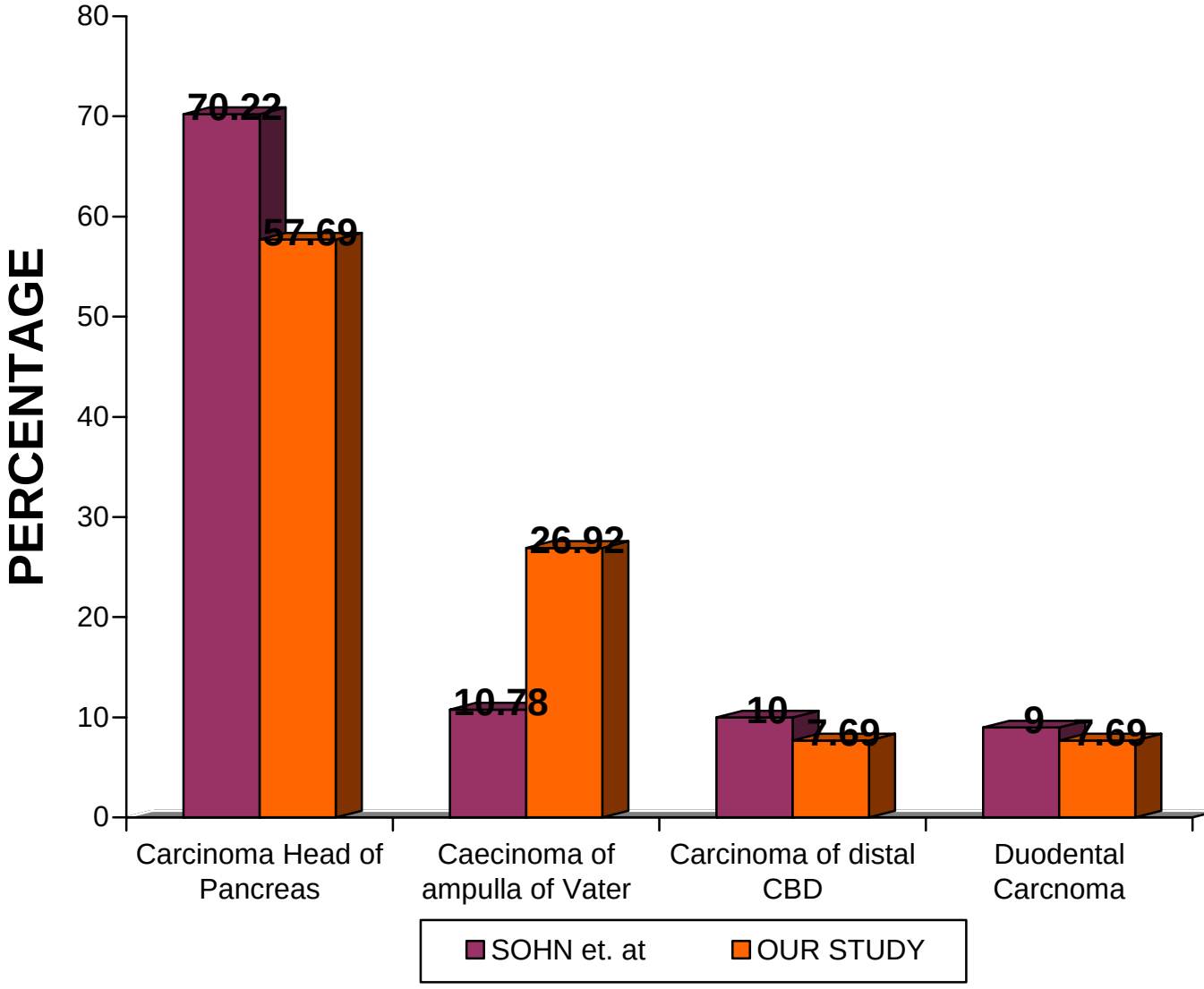
EXTENT OF DISEASE



MANAGEMENT OF PERIAMPULLARY CARCINOMA



LOCATION OF CANCERS



COMPARATIVE ANALYSIS OF SYMPTOMATOLOGY